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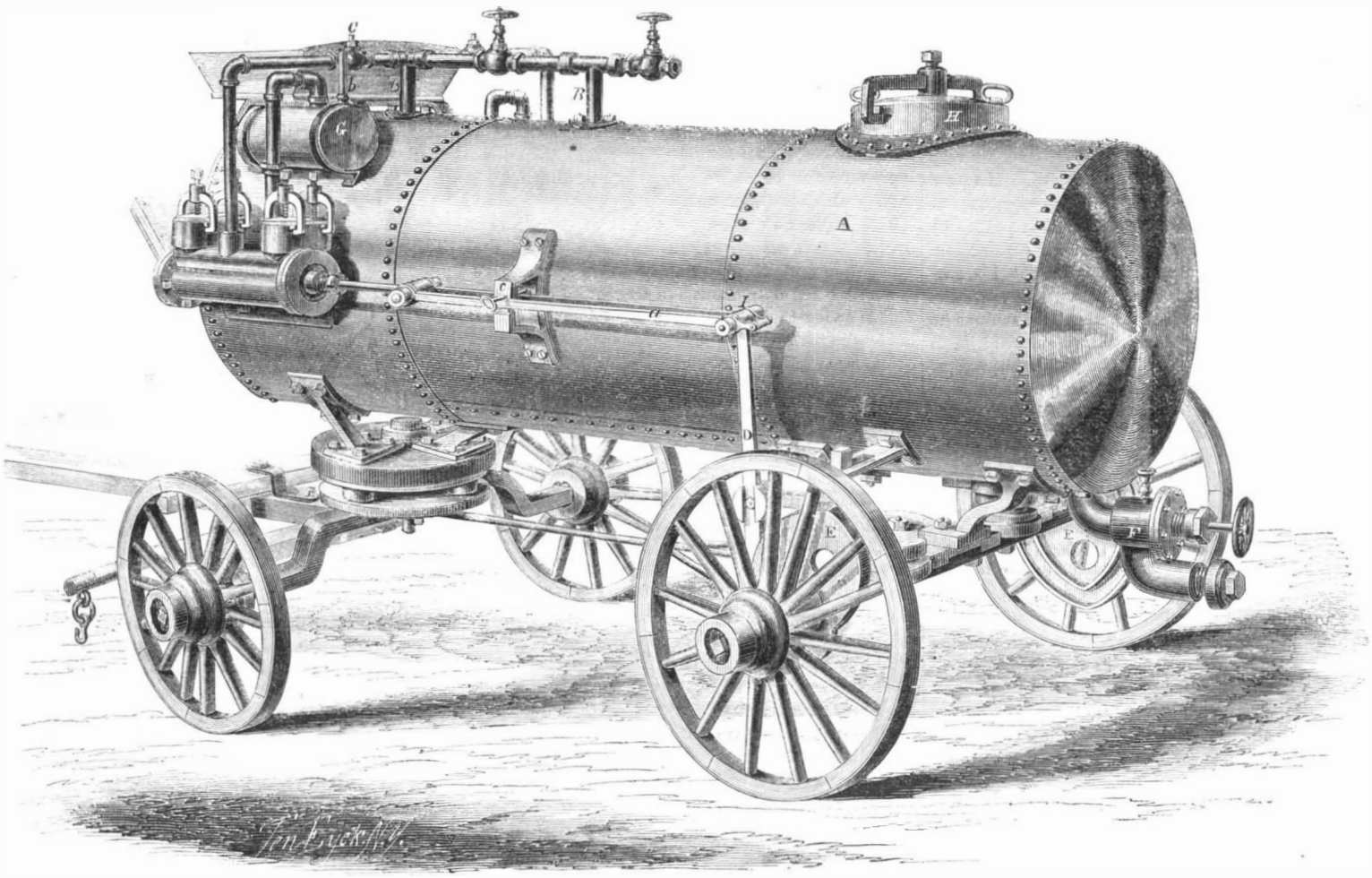
Improvement in Vacuum Tanks.

This invention consists of a truck upon which is mounted, in a suitable manner, a cylinder-shaped tank, A, resembling a steam generator in form, 7 feet in length and 38 inches in diameter, divided into two compartments, which are connected by the tubes, B, on the upper side of the tank. On the side of the tank there are secured two air pumps, having suitable connecting-rods, *a*, connecting with the check valves, C, on the top of the tank, through which the air from the two compartments of the tank is exhausted. The pumps, one on each side, are worked by the levers, D, receiving their motion from the cams, E, attached to the hind wheels of the truck. To the rear end of the tank is attached the main valve, F, through which the properties drained have to pass before entering the tank, and through which they are again discharged when the tank is to be emptied. Just over the pumps, and in connection therewith, are attached two small copper vessels, G, of the capacity of one gallon each. These contain a disinfecting fluid, and as the air is exhausted from the tank it passes through these vessels and is thus deprived of all bad odor. The exhaust pipe may be seen at *b*. The man-hole, H, is provided as a means of reaching the interior when necessary.

The working of the machine is as follows :—It is drawn by two horses, and as the wheels revolve they give motion to the lever which is connected to the piston rods and pumps. By the working of the pumps the air is exhausted from the tank. The object in having two compartments is, that while the larger one is the recipient of the solid substances drained, the smaller one absorbs the gases; when the machine is loaded and ready to be discharged, the gases exert a pressure on the matter, thus facilitating its expulsion. As the pumps are double-acting, as well also the cams, it will be seen that when the machine is driven at a common pace each pump receives two strokes each way at every revolution of the wheel. It is calculated that this would, under ordinary circumstances, form a vacuum in 15 minutes. To indicate the extent of the vacuum a gage is applied to the tank.

When the vacuum is formed and the machine has arrived at the place to be operated upon, a gutta-percha hose of suitable length having previously been laid down, the end of it is immediately coupled to the valve at the end of the boiler; the valve is then opened and in the space of two minutes the tank is filled with the contents of the sink, cesspool, or whatever place is operated on. When the machine is loaded the hose is detached and the whole apparatus driven off to the designated place of deposit. As a matter of course, the pumps are now disconnected from the motion of the cams and the levers. This is done by raising the rods—they merely hooking over the lever—and letting them rest on the pin, *c*, which would be below the rods when such alteration took place. During the above-described operation nothing offensive is seen, nor does any odor, whatever, arise; neither is there any hand labor, the machine doing all the work itself. On arriving at the place of deposit, the valve is again opened, a small length of hose attached, and the contents are discharged. By this method, an ordinary sink or cesspool can be drained in the space of half or three-quarters of an hour, provided four or five machines are at work, each taking one load. Each machine requires one driver and two horses.



WALTER'S INODOROUS DRAINING MACHINE.

The advantages of this invention over the present system, as now practiced in all our large cities, are apparent to all. As a sanitary measure these machines are extremely desirable, and should be adopted forthwith. They require little or no hand labor, and consequently can be worked at a much less expense than the present obnoxious method. They do in minutes the work it requires hours to perform by the other methods, and they can be worked in the day time during the year round without causing disgust. Three human lives were recently lost in Brooklyn by cleaning a sink in the old way. If this machine had been used no such accident would have occurred.

This invention was patented, through the Scientific American Patent Agency, on May 6, 1862, by Joseph P. Walter. Further information can be had by addressing Walter & Jones, 193 Broadway, New York.

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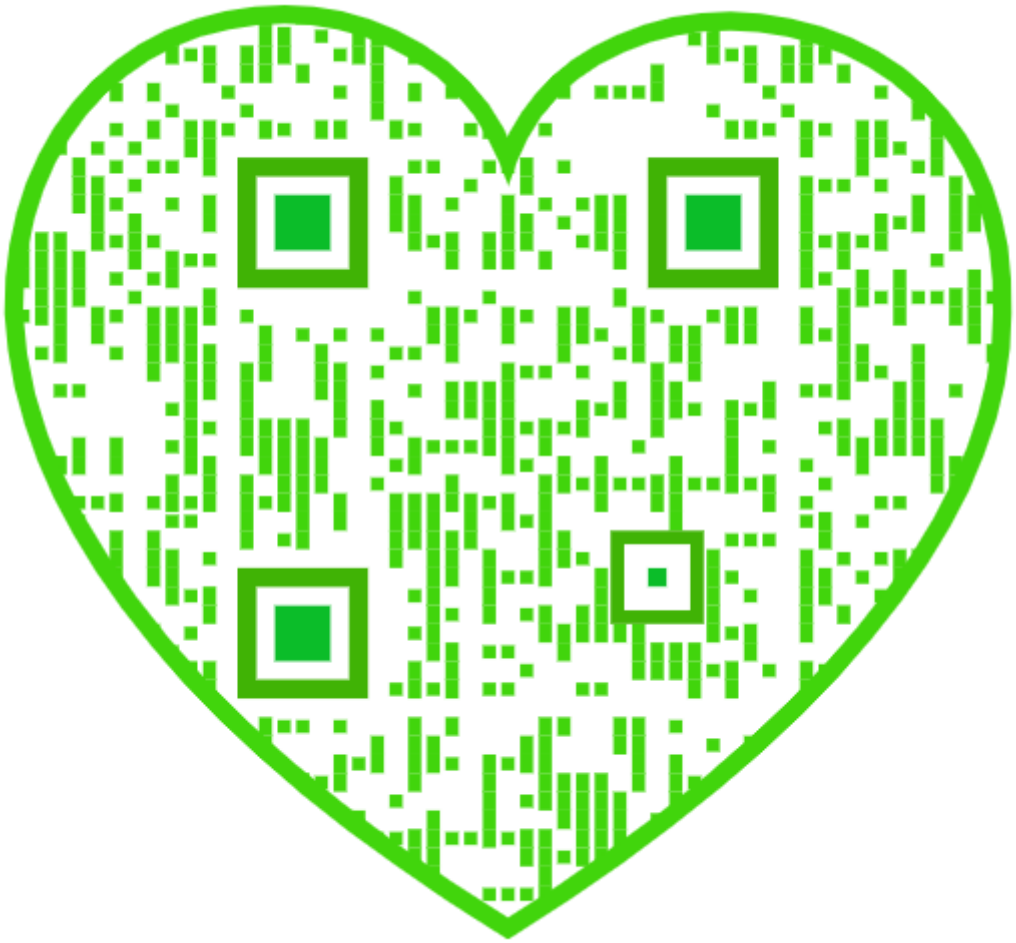

The Diamond Market.

For the first time in many years diamonds of the "first water" are not to be bought wholesale. The commencement of the present war found diamonds abundant and comparatively cheap. As the trade knows, however, diamonds in point of value are only second to coin. If of first water, free from defect, a diamond of a given size represents at all times a corresponding equivalent in coin. A tour among extensive dealers in and manufacturers of jewelry now shows a minimum stock, from which all the best have been culled, with great difficulty in filling their places, though prices have advanced fully seventy per cent. The duty is *ad valorem* ten per cent., but the cost of exchange brings up the price. During the last three years the demand for diamonds, we learn, has been quickened in the European capitals to a large extent. They were cheaper during the Crimean war than before or since. Wealthy Turks placed thousands of them in the market, and a desire to realize upon long-hoarded gems seized the minds of Christians as well as Mussulmen. Now matters are in a different position, and diamonds are *diamonds* in the strictest interpretation of the phrase. A new class of purchasers have sprung up. People who two years ago could not tell the difference between a tiara of gems in purest ray serene, and the gingerbread affairs sported by queens in tragedy, have of late been the best customers to the lapidaries. A case in point, narrated to us (yesterday) by a jeweller, is worth publishing.

An Irishman, dressed in fine clothes (to his very apparent discomfort), entered the store. His face was bronzed, his hands horny, his nose was an unmitigated pug, and his teeth were indelibly stained by second-class "Cavendish". A tailor had clothed him like a gentleman to the manor born, but his garments were an evident incumbrance.

"I want to look at some dimons," he said, as he entered the doorway. A junior clerk showed him to the "dimons" counter. He here repeated his request to a senior clerk. The latter took a quick glance at his customer, and made up his mind that the man had come to the wrong place.

"You wish to see diamond jewelry?"

"I do."

The clerk produced a tray filled with imitation gems, and submitted them for inspection.

The man fingered several of the articles without speaking, and as silently laid them down. "Thim isn't what I'm afther. I want the rale kind. Show me somethin' wid the rale sparrikle."

Thinking to get rid of a profitless customer the clerk produced a velvet case, in which reposed, in gorgeous effulgence, a bracelet, breastpin and earrings, in the finest diamonds.

"How do those suit you?" asked the clerk.

The man looked at them. "Ah! thim's the beauties. What's the price o' thim?"

"The set is seven thousand dollars," said the clerk, preparing to return them to the case, not dreaming of its purchase.

"Well, I'll take thim," was the quiet and prompt reply.

The clerk was somewhat astonished. In his experience the purchase slightly exceeded all former precedents.

Word was quietly passed to one of the firm that a seven-thousand-dollar customer was at the diamond counter, and the head of the house very briskly came forward. The result was the further purchase of a single-stone diamond ring at eight hundred dollars. The purchaser gave his check in payment for the lot. He was detained, without his knowing the fact, in an inspection of other goods, while one of the clerks was sent to bank to test the value of the check, but the clerk returned with the money, and the information that if drawn for five times the amount it would have been as promptly honored. Subsequent inquiry led to the discovery that the purchaser of the diamonds in question had accumulated money in following up the army and purchasing its offal for soap manufacturing, at the same time loaning money to officers at usurious interest, and purchasing claims of soldiers and others against the Government. The man, two years ago, was foreman in a lard and tallow factory.

This incident, which is literally true, is an illustration of the causes to which are attributable the present prices of gems. What is true of diamonds is true, also, of pearls, opals and emeralds. Rubies of any size are out of the market. Even garnets, the cheapest of all the precious stones, have advanced in price with the rest of the precious stones. The uncut garnet is termed a carbuncle; it is equally familiar in either form. At the Continental Hotel, the other day, we saw in the possession of a Cuban lady, a rosary, upon which she kept devotional tally, composed of a string of garnets. The larger ones were of the size of a hazel nut, the smaller ones the size of marrowfat peas. The entire affair, in ordinary times, would foot up to the value of a thousand dollars.

The transmutations caused in society by the present war are most singular. Many people, all their life long accustomed to the possession of gems, have parted with them forever; many others, who now wear them, knew not, two years ago, the difference between the finest diamonds and the glassy baubles that glitter upon the nude arms of the ballet girls and danseuses of the concert-saloons.—*U. S. Gazette.*

The Last of the "Gumbacks."

The counting of the soiled postage-stamps, which were deposited two or three months ago at the New York Post-office for redemption, is not only completed, but at least nine-tenths of the stamps have been redeemed, and notice is given to the owners of the remaining one-tenth that they should forthwith report themselves at the Post-office with their certificates of deposit, and receive current funds in lieu of their old "gumbacks." It is desired to close the account, and persons interested may save themselves inconvenience by making early application for the money which is due them.

The aggregate amount of claims of depositors is over $260,000, and the whole number of washed and other stamps which were thrown out is comparatively small, being only about five per cent. of the whole. This is owing to the care that was taken by honest holders to throw out all stamps that had been used before making their claims at the Post-office, so that a large proportion of the five-per-cent. of rejected stamps was offered with knowledge of their character, or fraudulent design.

The assorting and counting of the stamps has occupied three months' time. This work was performed, with that of redemption also, under the general supervision of the Post-master, but the particular direction of the whole was assigned to the Treasury Department. An agent of the Government also gave his attention to the details of the reception of the stamps and to other matters connected with the redemption. The counting of the stamps was a most troublesome business. Their denominations were from one to ninety cents; there were few, however, of greater value than twenty-four cents, and quite as many one-cent stamps were of the number, it is estimated, as of all other denominations. A considerable proportion were so begrimed with dirt that it was difficult to recognize them.

Some idea of the extent of the labor involved may be formed from the fact that the counting would have occupied one man for the space of two years and a half; and it is believed that that man, in consequence of the perplexing nature of the work, would, at or before the end of the time, have become insane. The number of persons who presented packages of stamps was about fifteen thousand, and the value of the packages ranged from one dollar to nearly nine thousand. In the course of a few days the last of the soiled stamps deposited at the New York Post-office will have been paid for and destroyed. The public will be glad to hear of this consummation.

The Wind as a Musician.

The wind is a musician by birth. We extend a silken thread in the crevices of a window, and the wind finds it and sings over it, and goes up and down the scale upon it, and poor Paginini must go somewhere else for honor, for lo! the wind is performing upon a single string. It tries almost anything on earth to see if there is music in it, it persuades a tone out of the great bell in the tower, when the sexton is at home and asleep; it makes a mournful harp of the giant pines, and it does not disdain to try what sort of a whistle can be made of the humblest chimney in the world. How it will play upon a great tree till every leaf thrills with the note in it, and the wind up the river that runs at its base is a sort of murmuring accompaniment! And what a melody it sings when it gives a concert with a full choir of the waves of the sea, and performs an anthem between the two worlds, that goes up, perhaps, to the stars, which love music the most and sung it the first. Then how fondly it haunts old houses; mourning under eaves, singing in the halls, opening the old doors without fingers, and singing a measure of some sad old song around the fireless and deserted hearths!—*Exchange.*

Trapping a Tiger.

A most ingenious mode of tiger-killing is that which is employed by the natives of Oude. They gather a number of the broad leaves of the *prauss* trees, which much resembles the sycamore, and having well besmeared them with a kind of bird-lime, they strew them in the animal's way, taking care to lay them with the prepared side uppermost. Let a tiger but put his paw on one of those innocent-looking leaves, and his fate is settled. Finding the leaf stick to his paw, he shakes it, to rid himself of the nuisance, and finding that plan unsuccessful, he endeavors to attain his object by rubbing it against his face, thereby smearing the ropy bird-lime over his nose and eyes, and glueing the eyelids together. By this time he has probably trodden upon several more of treacherous leaves, and is bewildered with the novel inconvenience; then he rolls on the ground, rubs his head on the earth in his effort to get free. By so doing he adds fresh bird-lime to his head, body and limbs, agglutinates his sleek fur together in unsightly tufts, and finishes by hoodwinking himself so thoroughly with leaves and bird-lime, that he lies floundering on the ground, tearing up the earth with his claws, uttering howls of rage and dismay, and exhausted by the impotent struggles in which he has been so long engaged. These cries are a signal to the authors of his misery, who run to the spot, armed with guns, bows, and spears, and find no difficulty in despatching their blind and wearied foe.—*Routledge's Illustrated Natural History.*

About Roses.

A correspondent of the *Culturist* writes to that journal concerning the care and treatment of roses. As the season of this beautiful nymph of Flora is rapidly approaching, our readers will doubtless find much advantage from perusing the letter which we here append:—

"Everybody loves the rose, and almost every one desires to possess information that will tend to give the greatest possible effect to this pet of the garden and conservatory. It is not as well known, perhaps, as it might be, that to have roses in full perfection of size and color, proper planting and exposure are absolute essentials. The rose requires abundance of air and light, and to look their very best I think that judicious grouping is indispensable. I know no way of accomplishing this more effectually than by pyramidal grouping, that is, forming a rose pyramid, rising gradually in highth from the minutest dwarf at the base, to the tallest standard at the apex. As the varieties are almost endless, it would be impossible to enumerate them. Almost every florist's catalogue will supply the list, and the taste of the operator direct the arrangement. A proper discrimination should of course be manifested in regard to the time and continuance of blooming, so as to secure the finest possible effect. I once read of a very simple method of imparting a stronger and more agreeable odor to the rose. It is done by planting one or two large onions close to the root. It is said that water distilled from roses grown under such circumstances is decidedly superior to that prepared from ordinary rose-leaves. It is a French idea, and as it will cost little to try it, perhaps some persons may feel disposed to experiment on it."

THE "INDIANOLA."—There is no doubt now about the fate of the *Indianola*. A letter to the Cincinnati *Gazette* from Young's Point, La., says:—"The wreck of the *Indianola* stands several feet out of water, and could have been raised by the proper means; but as this is impossible, under the circumstances, Admiral Farragut amuses his ship's crew by firing broadsides into the wreck each time he passes up or down, so as to prevent it from being of any use to the rebels, provided they should ever raise it."

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VALUABLE RECEIPTS.

Transferring Prints to Glass, Wood, &c.—When it is desired to transfer a steel, copper or lithographic print to glass, the first operation is to coat the glass with dilute lac or clear copal varnish. The print is then moistened with water, and while the varnish remains sticky, the paper is placed on the glass with the print side upon the varnish; it is then pressed gently to make it adhere. Several folds of white paper are now placed upon the back of the print, also a board with a light weight thereon to keep the print and varnish in contact till both are dry. After this the paper is moistened and rubbed off gently with the fingers, when the ink composing the print is left adhering to the glass. The several parts of the print may then be painted with appropriate colors and then finished with a ground coat over all. Prints may be transferred to wood in the same manner. The common mode of transferring prints to wooden blocks, for engraving, is to immerse a print for a short period in a solution of potash, then place it upon the block and press it. The potash softens the ink on the paper of the print, and, when placed upon the block of wood and pressed, the impression is made in the same manner as printing in the usual way. Prints are also transferred thus to stones for lithographic printing; also to plates of zinc for printing in a lithographic press.

Staining Marble.—A solution of the nitrate of silver stains marble black; a solution of verdigris applied hot stains it green; a concentrated solution of carmine applied hot stains it red; orpiment dissolved in ammonia stains it yellow; the sulphate of copper, blue; and a solution of magenta, purple. The marble should be warmed before any of these solutions are applied, so as to open its pores and enable it to absorb more of the coloring matter. Marble may be stained according to beautiful designs with such colors. This art was more extensively practiced in Italy during former ages than it is at present.

Coppersmith's Cement.—Boiled linseed oil and red lead mixed together into a putty. The washers of leather or cloth are smeared with this mixture in a pasty state. Resin mastic alone is sometimes used by jewelers to cement, by heat, cameos of white enamel or colored glass to a real stone, as a ground to produce the appearance of an onyx.

Plumber's Cement.—Black resin 1 part, brick-dust 2 parts, well incorporated by a melting heat.

Cement of Dihl for coating the Fronts of Buildings.—This cement consists of linseed oil, dried by being boiled with litharge, and mixed with porcelain clay in fine powder, to give the consistence of stiff mortar. Brown color may be given with ground bricks or pottery. A little oil of turpentine aids its cohesion upon stone, brick or wood; it may be applied to sheets of wire cloth and laid upon terraces to make them water-tight; but lead is not much more expensive.

Cement for Wine-bottle Corks.—This cement consists of pitch hardened by adding resin and brick-dust.

A Composition for Architectural Ornaments is formed of glue, chalk and paper pulp; the paper aiding the cohesion of the mass.

APPLICATION FOR THE EXTENSION OF A PATENT.

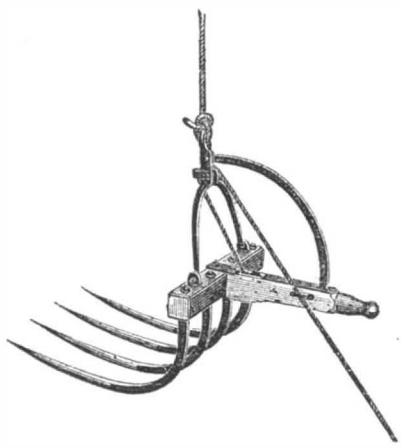
Ox-yoke Fastening.—A. A. Hotchkiss, of Sharon, Conn., administrator of the estate of Andrew Hotchkiss, deceased, has applied to the Commissioner of Patents for the extension of a patent granted to said Andrew Hotchkiss, on July 17, 1849, for an improvement in Ox-yoke Fastenings. The petition will be heard at the Patent Office on June 29th; the testimony will be closed on the 15th of that month.

Wood Paper.—There is an establishment at Royer's Ford, Pa., in which paper is manufactured from wood. Any kind of white wood is used. From five to six cords are consumed each day. About two and a half tuns of paper are manufactured per day, running day and night. Over fifty hands are employed and the paper is used by a number of the leading newspapers. The experiment of making writing paper is just being tried. The art of making paper out of wood is decidedly a novelty and is well worth the attention of the curious.—*Exchange.*

IMPROVED HORSE HAY-FORK.

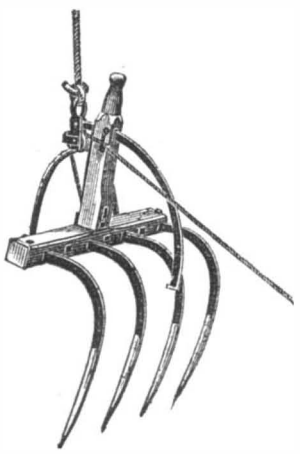
Great benefits have of late years been conferred upon our farmers by the successful application of improved implements and machines for saving severe human labor. The pitching of hay in the barn by hand was among the most laborious exercises of the farmer; but he can now be relieved of this toil by applying horse-power to unload his wagons, by a simple adjustable fork like the one represented by the accompanying figures. One of these figures represents the fork in a position ready to be pushed into the hay on a wagon, and the second represents it in the position it occupies when discharged.

Fig. 1.



The teeth of the fork are secured in the usual manner in a cross-head, to which is fastened an iron suspension yoke. On the top of this yoke is an eye to which the rope is secured that elevates the fork with its load, and also lowers it. This rope passes up over a pulley secured in a beam of the barn, then down and over a pulley fastened to the floor, thence to the horse which operates the fork. A shank projects behind the head of the fork, in the interior of which is a sliding spring catch. A metal bow-brace, secured to the head of the suspension yoke, passes backward through an opening in the shank. On the lower end of the bow-brace is a notch, shown in Fig. 2. A cord is attached to the inner end of the sliding spring catch in the shank, thence carried over a roller in the yoke and down to the person who is on the wagon, or the one who is to discharge the fork. The fork is thrust into the hay by taking hold of the shank and yoke with the fork in the position as shown in Fig. 1, then it is raised with its load by the horse drawing on the upper rope shown. When the fork has arrived at the place where it is to be

Fig. 2.



discharged, the cord is drawn which liberates the brace-bow, and the fork is canted as shown by Fig. 2. This is a very simple horse-fork. It requires no attention until it arrives where it is to be discharged, and it can readily be moved to any point in a barn so as to swing directly over a mow. By it the greatest labor in harvesting the hay crop is rendered comparatively easy, and a tun of hay may be unloaded with it in a few minutes. A patent was granted for it on Feb. 4, 1862; for further information address George W. King & Co., Greenville, N. Y.

The gold fields of New Zealand are now yielding at the rate of 20,000 ounces per week.

Bristol's Anti-friction Slide Valve.

We have examined a model of this apparatus, and found the mechanical arrangement very simple. It consists of a slide valve mounted upon steel rolls in such a way that the weight, amounting to several tuns in a large valve, is removed from the valve seat and the valve itself enabled to move easily back and forth; thus relieving the tremendous strain on the valve rods and eccentrics, and adding materially to the effectiveness of the machinery. The inventor has experimented very carefully upon the relative proportions of the two surfaces—those under the rolls and the valve face itself—and we are assured that the latter is always steam-tight, requiring no lubrication and unlikely to cut when neglected. If all the conditions claimed for this invention are obtained, it is certainly a long-sought-for desideratum and solves a great problem in steam engineering. These valves are now fitted to some new engines in United States sloops-of-war. See advertisement on page 287.

LITERARY NOTICE.

Annual of Scientific Discovery.—A Year-book of Facts in Science and Art. Sheldon & Co., New York; Gould & Lincoln, Boston.

This volume presents in a compendious form a large amount of scientific information, useful for reference and interesting to those who are fond of natural science. The work is prefaced with an admirable portrait of John Ericsson, the inventor and engineer, to whom is attributed the honor of bringing into public use the *Monitor* batteries. The several discoveries in manufactures and the arts are alluded to, and all objects of interest in the material world have their appropriate place alloted them. Information that can be obtained from no other sources is here easily attainable, and will be highly prized by the searcher-after-facts concerning the progress of the world. Mr. David A. Wells is the editor, and the arrangement of the matter does credit to his taste and judgment.

"Well's Commercial Express and Produce Reporter."—We have often desired to obtain statistics of the grain crops and of the cereals generally which are raised at the West, and we have always found *Well's Commercial Express and Produce Reporter* a reliable reference for the purpose. It contains a large amount of useful intelligence on those points, and has, in addition, extracts from the best journals of the day; also, the latest market reports and editorial suggestions to the business community, which are doubtless valued and heeded. Every merchant in the produce trade should consult its columns.

The National Academy of Sciences.—At the late session of Congress, an act was passed for the formation of a National Academy of Sciences, and fifty corporators, mostly members of the American Association for the Advancement of Science, were included in the bill. A preliminary meeting of the corporators were held in this city, last week, and fifty members were present; Prof. Joseph Henry of the Smithsonian Institute, was chosen president. A committee was appointed to report a plan of organization for the Academy.

Moving a Chimney.—A remarkable work was accomplished at Worcester, Mass., last week. The chimney-stack at the iron-works of Nathan Washburn, which is 100 feet high, having in it 60,000 bricks and weighing 170 tuns, was moved a distance of 150 feet and turned partly around, without the slightest accident, and not even a brick was dislocated.—*Commercial Bulletin.*

A woman was walking in a street in Philadelphia the other evening, with a box of matches in her pocket, when she fell; the fall ignited the matches and her clothes were set on fire; in her alarm she started to run, thereby fanning the flames, and she became so badly burnt that she soon after died in the hospital.

Accounts from the principal agricultural centers of the Western States inform us that the prospect for the coming crop of winter wheat is very good. Notwithstanding the great scarcity of labor, more than an average breadth of land has been sown in most places.

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Draining a Classic Lake.

In Southern Italy, not far from the frontiers of the Roman States, an interesting work of engineering is now being prosecuted. This is nothing less than the attempt to drain the famous Lake Fucino. This lake is simply a great pool surrounded by mountains. Last year the waters of this lake were drawn off through a tunnel, four miles in length, which had required eight years to cut; and drains are now being made in the seat of the lake for rendering the recovered soil fit for cultivation. The lake covered 40,000 acres of land, which in a few years will be converted into arable land. Julius Cæsar planned the draining of this lake nearly nineteen hundred years ago, but the Emperor Claudius made the first attempt. Pliny describes the wonders of a tunnel following the sides of a mountain at a depth of a hundred feet. And it was, indeed, an astonishing attempt in those days, when the engineers had none of the appliances of modern science. Claudius employed 30,000 men in the attempt for eleven years, and exhausted the public treasury. When he believed that his work was complete, he celebrated the event by one of the greatest *naumachia*, or water-fights of Roman times, in which 19,000 men, divided into two fleets, fought to death "to make a holy-day." Claudius, Agrippina and young Nero (who, a few months later, became master of the empire), the imperial court and an immense crowd of spectators were present at this fearful and imposing gladiatorial contest. When the play was terminated, the dam which stayed the waters from the tunnel was removed, and they rushed in with a roar, but soon rolled back. The tunnel was a failure! The cause of this failure remained hidden for centuries. The work was re-commenced under Trajan and Adrian; still later by Frederick II., in 1240; by Alphonso I., of Arragon, in the seventeenth century; and lastly, by Frederick I., king of Naples, in the eighteenth century; but all failed. In 1826, Afan de Rivera, Chief of the Public Works in the kingdom of Naples, obtained leave to clean out the cut or drain made by Claudius. This work was finished in 1835, but the problem of draining the lake was as far off as ever. At length, in 1853, a Neapolitan company obtained permission to drain the lake and take the reclaimed bed for their remuneration. On investigation, it appeared that the tunnel constructed under Claudius had not been so devised as to draw the water from the lake, the Emperor had been cheated by his Minister of Public Works. The engineer of the modern company finally decided to destroy the Roman work and make one of double the dimensions.

Aniline Colors—Who is the Inventor of Aniline Red?

It is generally conceded that Prof. Hofmann, of London, England, is the original and first inventor of the red color derived from aniline. Some doubts have been raised, however, in the minds of many inventors and manufacturers in this country, in regard to this fact, since Joseph Renard, of Lyons, France, has obtained patents in France and in the United States, in which he claims, as his invention, the red coloring matter obtained by treating aniline with a metallic salt, or its equivalent. To clear up these doubts we publish the following data:—

The process of Prof. Hofmann, in London, has been published in *Les Comptes Rendus de l'Academie des Sciences*, Vol. XLVII., page 492, in the number for October, 1858, under the head of "Action of Bichloride of Carbon on Aniline."

At the usual temperature bichloride of carbon and aniline have no reaction on each other; at the temperature of boiling water the mixture begins to change, but even after a digestion of several days the reaction is not at all complete. By submitting a mixture of one part of bichloride of carbon and three parts of aniline, both perfectly anhydrous, during a period of about thirty hours, to a temperature of 170 to 180 degrees Centigrade, that is, to the boiling temperature of the aniline, the liquid is transformed into a blackish mass, either soft and sticky or hard and brittle, according to time and temperature. This black mass, which adheres with great tenacity to the retorts in which the reaction has been effected, is composed of several different materials. By washing it well in water a portion of it is dissolved, and the rest remains insoluble in a resinous state of more or less solidity. The aqueous solution produces with potash an oily precipitate which contains a considerable proportion of unchanged aniline. By boiling this precipitate in a retort with diluted potash, the aniline passes over by distillation until a sticky oil remains, which solidifies with a crystalline structure. By washing with alcohol and by one or two crystallizations in boiling alcohol, the mass is rendered perfectly white and pure, and a very soluble substance, —a beautiful crimson—remains in solution. That portion of the black mass which remains insoluble in the water dissolves readily in hydro-chloric acid; from this solution it is again precipitated by alkalies in the state of an amorphous powder of a dirty red soluble in alcohol, to which it imparts a rich crimson color. The greatest part of this substance is the same coloring matter which accompanies the fatty crystalline substance.

We now give a verbal translation of the original specification of Joseph Renard's patent on the preparation and use of "fuschsine" (a new red coloring matter), taken out in France, and dated April 9, 1859:—

We have given the name of "fuschsine" to this matter on account of the resemblance of its color to that of the flower "fuchsia." To obtain it we heat to ebullition a mixture of aniline and of anhydrous bichloride of tin, the ebullition being continued for 15 to 20 minutes. At the beginning the mixture turns yellow, it darkens, becomes reddish, until at the end it turns out to be a beautiful red, when it appears in small layers of a black color. At this moment, and while it is still liquid, it is poured in water, and the whole heated to ebullition; the fire is withdrawn, the moisture is left standing for an instant, to allow the insoluble parts to settle down, it is then filtered while hot, and the residuum is further extracted by repeated ebullitions with water. The filtered liquor contains the coloring matter in solution. In order to separate it, its property, to be insoluble in saline solutions, is made use of by adding to the liquor certain soluble salts in the solid state, for instance, chloride of soda, neutral tartrate of potash, neutral tartrate of soda and many others; the salt dissolves and the coloring matter precipitates in the solid state; it is separated by decantation or filtration. To use it, it is dissolved in water, and with this bath the dyeing is effected without mordants or by using the ordinary mordants, acids or salts, with the exception of mineral acids, which alter the color. In the same manner a red color is obtained by the reaction of other anhydrous metallic chlorides on aniline, amongst others, those of bichloride of mercury, perchloride of iron and protochloride of copper.

By the foregoing description we desire to reserve for ourselves the sole property in the following things:—1st, The production of that new coloring matter obtained by the reaction on aniline of certain anhydrous metallic chlorides, and particularly of the bichloride of tin. 2d. The application of this coloring matter for dyeing or printing textile fabrics, silk, wool, cotton and thread, and also hides and feathers.

By comparing the two descriptions the following result is arrived at:—

	Hofmann.	*Renard.*
Organic base used.....	Aniline,	Aniline,
State of this base.....	Anhydrous,	Anhydrous,
Variable agent.....	Bichlo. of car.,	Bichlo. of tin,
State of this agent.....	Anhydrous,	Anhydrous,
Temperature.....	Ebullition of the aniline,	Ebullition of the aniline,
Coloring matter obtained,	A magnificent crimson,	A beautiful red,
Nature of this matter....	A resin,	A resin,
Mode of extraction.....	By dissolution in water.	By dissolution in water.

It is unnecessary to continue the parallel any further; by looking at the dates of the two descriptions it will be seen that Hofmann obtained the same color by nearly the same process (the only difference being that one uses bichloride of carbon and the other bichloride of tin) which Renard claimed as his invention about six months after the publication of Hofmann's process in *Les Comptes Rendus*.

Direct Photographic Printing on Paper.

The following remarks were written by M. Poitevin, and published in the *Bulletin de la Societe Francaise de la Photographie*:—

"In the new principles of permanent printing in carbon or other inert pigment, which I submit, the pigment remains imprisoned in an organic material, originally insoluble, and remaining so in those portions not acted upon by light, or coagulated in certain parts only of the impressed surface. The first principle, that which I have most followed up to the present time, rests upon a well-known reaction—the insolubility communicated to organic matters, such as gum, albumen, gelatine, &c., by salts of iron, the perchloride, for example, and upon a new fact which I have observed, which is, that this matter, coagulated and rendered insoluble in cold or warm water, becomes soluble under the influence of light, in presence of tartaric acid, which, reducing the ferric compound, restores the organic matter to its natural state. Gelatine is the substance with which I hav succeeded best. The following is my mode of operating. I dissolve 5 to 6 grammes of gelatine in 100 grammes of water, and add sufficient quantity of carbon or other inert pigment to obtain the intensity of tone I desire to produce. I pour this solution into a flat dish, and keep it warm so as to prevent the gelatine solidifying. Each sheet of paper is floated on one side only on this solution, and a uniform coat of colored gelatine adheres to it; I then place the sheet of paper on a flat surface and leave it to dry spontaneously. To sensitize these sheets, I impregnate them on both sides with a solution of perchloride of iron and tartaric acid in the proportion of 3 to 1. The quantities which have appeared to me most suitable being 10 grammes of perchloride to 100 cubic centimetres of water, and 3 grammes of tartaric acid. I leave the thus-prepared sheets to dry in the dark; then the coating of gelatine has become completely insoluble, even in boiling water. I print these surfaces from positives on glass or on paper, and in all those portions upon which the light acts, the coating becomes soluble in warm water; this solubility, be it understood, commencing from the surface. After a few minutes' exposure to the sun, if the positive *cliché* be not very dense, which is preferable for this kind of printing, I remove the paper from the printing frame, and immerse it in warm water; thereupon all the parts which have been modified by light dissolve in proportion to the quantity of light which may have passed through the various portions of the positive *cliché*. In the parts corresponding to the lights of the *cliché*, the black or colored coating will be dissolved down to the surface of the paper, leaving perfect whites, while in the half-tones a part only of the coating will dissolve, commencing with the surface, and these half-tones will be rendered upon the greater or lesser thickness of the coating of gelatine remaining insoluble; and as this part is in immediate contact with the paper, it cannot be removed by washing; as to the portions of the negative which are entirely black, they will be rendered by the entire thickness of the primitive coating. To complete the proof, it is only necessary to dry it in the air, or treat it with water acidulated with hydrochloric acid, which removes the stain of salt of iron, then to wash it freely in water, and dry it again spontaneously. It is now unchangeable, but a tanning of the gelatine, accomplished by known methods, with alum, bichloride of mercury, &c., will give it greater solidity. Before this fixing we can make whites wherever they may be required, by means of a pencil dipped in warm water. We do not encounter such dangers in this method as presented themselves in that I proposed in 1855, in which I employed a coating of gelatine mixed with an alkaline bichromate and carbon, and which I printed by means of negatives; for in that method the gelatine was rendered insoluble by light, commencing at the surface, and the half-tones were removed in the washing, undermined from beneath by a portion of the coating remaining soluble. The method I now propose does not possess this inconvenience, and to obtain perfect proofs by it requires only suitable paper with a glazed surface, uniformly coated with a film of the colored preparation, which will be found easy to realize in practice."

Gases of Decaying Vegetation.

The following are condensed extracts from an interesting paper, lately published by M. Bossingault, the distinguished French chemist:—

M. Boussingault remarks that Mr. Bennett many years ago, first took notice of the emission of air from the surface of leaves; Priestley recognized this air to be oxygen; and Senebier proved that the oxygen gas eliminated by leaves under the light of the sun came from the decomposition of carbonic acid gas. Théodore de Saussure, nearly at the beginning of the present century, ascertained the fact that the volume of oxygen gas produced was not quite equal to that of carbonic acid decomposed; and, also, that nitrogen gas was always evolved, to an amount about equal to that of the oxygen gas which had disappeared. He supposed that this nitrogen came from the substance of the plant; not considering, what is now obvious, that the substance of the plant did not contain, and therefore could

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not have furnished, anything like this quantity of nitrogen.

In modern times, Daubeny was unable to obtain from leaves oxygen gas free from azote; and Prof. Draper states that he found the astonishing amount of from 22 to 49 per cent. of the gas emitted from the leaves of *Pinus tæda* and *Poa annua* to be nitrogen. The first step towards the elucidation of the matter was made by Cloëz and Gratiolet, who, exposing the leaves of a common pond-weed in water slightly impregnated with carbonic acid, found, the first day, that 15.70 per cent. of the gas eliminated was nitrogen; the second, 13.79; the third, 12.00; the fourth, 10.26; the fifth, 9.53; the sixth, 8.15; the seventh, 4.34; the eighth, 2.90—that is, the oxygen gas grew purer and purer, exactly as if the azote retained in the tissues of the plant, or in the water, was gradually expelled by the oxygen. Similar experiments were made by Boussingault in 1844, confirming these results; and also, later, a set of comparative experiments, with and without leaves, which confirmed the truth of the conjecture as to the source of most of the nitrogen. But, after all, he could not obtain any oxygen gas free from azote.

Boussingault now devised a new method of proceeding, by which he avoided the difficulty about extraneous nitrogen, &c. The average results of 25 experiments, made with a variety of plants, are that 100 measures of carbonic acid gas, decomposed by foliage under the light, gave 97.2 of oxygen gas; and that 1.11 of azote had appeared, which could not have come from the water, nor have been contained in the plant. At this point, Boussingault raised the question whether this gas, which remained after the absorption of the oxygen was really nitrogen. A set of experiments, devised and executed in this view, brought out the interesting result, that the supposed azote—which, moreover, corresponded very nearly with the amount of oxygen gas that had disappeared, was oxide of carbon, *i. e.*, carbonic oxide—also a little protocarburet of hydrogen. So, foliage, during the decomposition of carbonic acid, does not really emit nitrogen gas, but, with the oxygen gas, emits some oxide of carbon and some protocarburet of hydrogen; and these combuttible gases, like the oxygen, are produced only under the light of the sun. These gases constantly accompany the oxygen, when the sun acts upon a vegetable submerged in water impregnated with carbonic acid. Is this also the case when carbonic acid is decomposed by foliage in the air?

Boussingault concluded his paper with the remark, that the earlier observers looked at their discoveries rather from the hygienic than the physiological point of view; that, while Priestley announced his brilliant discovery, by the statement that plants purify the air vitiated by combustion or by the respiration of animals, it is curious that, a century afterwards, it should come to be demonstrated, before the Academy of Sciences, that probably the leaves of all plants, and certainly those of aquatic plants, while emitting oxygen gas, which ameliorates the atmosphere, also emit one of the most deleterious of known gases—carbonic oxide! He closes with the pregnant and natural query, whether the unhealthiness of marshy districts is not attributable—at least in part—to the disengagement of this pernicious gas by plants?

National Finances.—The appropriations made by the Thirty-seventh Congress are as follows:—Extra session, July, 1861, about $264,000,000; long session, ending July 17, 1862, $913,000,000; short session, ending March 4, 1863, $1,100,000,000. Receipts from duties on imports, internal revenue, direct taxes, sales of public lands, &c., and estimates from March 4, 1861, to July 1, 1864, $320,000,000—which, deducted from the above sum, will leave the amount of indebtebness up to July 1, 1864, including the $70,000,000 debt left by the last Administration, $2,627,000,000.

New Telegraph Instrument.—An ingenious German mechanic in Washington has nearly perfected a new telegraph instrument, which is on an entirely different principle from those now in use, and may prove far superior to any of them. He is aided by two wealthy newspaper-proprietors, who supply him with ample means for making his experiments.

Correspondence

Was the "Keokuk" a Failure?

Messrs. Editors:—One of the greatest minds this planet has produced—a countryman of ours—on an occasion familiar to us all, commenced his greatest speech in the Senate of the United States in the following words:—"When the mariner has been tossed for many days in thick weather and on an unknown sea, he naturally avails himself of the first pause in the storm and the earliest glance of the sun to take his latitude and ascertain how far the elements have driven him from his true course." I have imitated this example, and avail myself of the "first pause in the storm" which has overtaken the *Keokuk* to examine her bearings, and by a plain statement of facts, which, with your permission, I will lay before my countrymen, leave them to determine "how far the elements have driven her from her true course." I shall endeavor to show that in the short life of the vessel she developed qualities which no other iron-clad hitherto built in this country possessed to the same degree, and that if her armor was not proof against the artillery of the enemy she combined other elements of scarcely less importance, and which should save her from the harsh judgment which a few unthinking minds have passed upon her.

The *Keokuk* was built for a light draft vessel, and, when ready for action, her draft was about 9 feet aft and 8 feet forward. She was a small vessel, being but 159½ long, over all, including ram and rudder. She was designed to have speed, and she attained it, running out of New York harbor at the rate of 10 miles an hour. She was intended more particularly for intricate navigation—to ascend the Southern inlets and rivers—and to do this, it was necessary she should be manageable and obey her helm promptly, which she did. She was designed to be sea-worthy, and she proved herself eminently so. She was thoroughly ventilated, and without the use of artificial means; well lighted in her cabin and wardroom, and her accommodations generally were as good as on any vessel in the service of the same tunnage. The *Keokuk* was intended to be shot-proof against ordnance in use in the naval service of the United States, at the time she was designed, and I have it from the lips of her commander, that he believed she would have proved so; but against such bolts and missiles as the rebels threw (supplied them by our neutral friends across the water), she was not proof; nor were any of the other iron-clads engaged in the action, four out of the seven of the *Monitors* being disabled, although not exposed—as is admitted on all sides—to so severe a fire. She took into action, amidst the most terrific cannonading the world has ever seen, about one hundred men and brought them all out alive, and the most severely wounded—Ensign McIntosh, as brave and true an old salt as ever trod the deck of a ship—is, I learn to my great joy, in a fair way to recover.

The apparent thickness of armor on the sides of the *Keokuk* was 5¼ inches, put on in a peculiar manner, viz., bars of iron, 4 inches wide and 1 inch thick, were placed edgeways over the skin of the ship, running fore and aft, 1 inch apart, and between them were placed strips of wood of the same dimensions; over this were laid two plates of iron, each ⅝th of an inch thick, secured on the edges of the bars by 1⅛-inch bolts running between them and through the skin and fastened by a nut on the inside of the vessel. The actual weight of metal in armor on her sides, as will be seen from this description, was 130 pounds per superficial foot, equal to a solid plate of only 3¼ inches in thickness. On the turrets an additional ½-inch plate over the two ⅝ths, increased the apparent thickness of armor to 5¾ inches, and the weight of metal to 150 pounds per superficial foot, equal to a solid plate of 3¾ inches. The question will naturally be asked—why was not the vessel more heavily armored? Simply because a vessel of her dimensions would not support any more. Increase the size of the vessel and the armor may be increased in the same ratio. If vessels clad in eleven inches of solid iron were disabled and placed *hors du combat*, is it to be wondered at that a little vessel, carrying but about 3¾ inches of solid metal, could not stand the racket? To recapitulate:—The *Keokuk* proved to be sea-worthy; to have speed; to be perfectly manageable, to be well lighted, naturally; to be well ventilated; without the use of artificial means; to have great stability; she preserved the life of every man she took into action, although sustaining the heaviest fire of any vessel in the fleet; but she was not proof against the missiles used by the enemy, nor were any of the other vessels engaged in the action; no part of the machinery of the vessel was disabled or gave out.

This whole business of iron-clads is in its infancy, and we must expect occasional disaster until experience has shown us where the weak points are, and how to strengthen them. Now that portion of the life of a vessel which is passed in action is an exceedingly limited one, and sacrifices too great can be made of creature comforts, of those immutable laws which govern and regulate health—light, air and exercise—to accomplish certain results. In the *Keokuk* I attempted a compromise, keeping in view the points I have named; and I have vanity enough to believe, that if the vessel had been twice her size, with a corresponding weight of armor, she would have passed through the fiery ordeal successfully. I mourn her loss, for I had fashioned her and watched her as she sprung into life as a parent does his first-born child. She carried with her the toil and care of many a weary day and night, and that she has not done better service, is not because those connected with her did not labor most earnestly to that end.

I have stated my case, and leave it with entire confidence to the judgment of my countrymen. The question of success or failure will be by them decided. I am prepared to submit to the people's verdict, whatever that may be; but I am not to be put down with the cry of failure, without at least measuring my strength with those who are raising it and exulting over what they suppose to be my downfall.

C. W. Whitney.

Breech-loading versus Muzzle-loading Guns.

Messrs. Editors:—In that number of the Scientific American issued on March 7, 1863, I observed a communication (page 150) and an editorial (page 154), both on the above topic; and, as it is a subject on which I have had some experience and to which I have given considerable thought, I also desire to say a few words on it. With the communication I was pleased, because it presented an important truth in so clear a light as to leave no question on the main point asserted. The editorial I read with considerable surprise, at least that part of it which talked about breech-loaders "leaking at the breech," and "the flash of the charge in the face of the marksman rendering his aim unsteady." But when I read further, and found that you did not include those breech-loaders using the metallic cartridge, and that the only evidence of leaking at the breech and the flash was found in the "earlier Sharpe's rifles," I was considerably relieved. Now, I submit that this is not fair treatment of the subject. As to the flash in some of the earlier and defective breech-loaders, it is no more evidence against the perfect ones of the present day than would be the old match or flint lock when quoted as evidence against the perfected muzzle-loaders of modern times. By no fair construction can a party, arguing in favor of breech-loaders, be supposed to mean any but the best; certainly not defective, inferior or discarded kinds. Now, as you admit that neither of those objections lies against metallic-cartridge breech-loaders, and thus, therefore, that kind is the best, and consequently the one, in all fairness, to be used in the contest between the two classes, it seems to me that that objection is done away with—that it has no application in a discussion of this sort. But I go further, and affirm that, whatever may have been the fact with the "earlier" Sharpe's rifle, the present arm of that make does not leak at the breech and does not flash in the face of the marksman; I have fired the carbines and rifles repeatedly since the war began, and I never knew an instance of either. Thousands of them are in use in our army, and I do not believe you can find a man there who will say that there is any trouble on either of those points.

Second, It is objected that the ball may not be entered accurately, and therefore its flight will not be

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accurate. That is just as true of, and as applicable to, one kind as to the other. It matters not whether the ball be entered at the muzzle or the breech. If its axis does not coincide with that of the bore, its flight will not be accurate. The only question, therefore, is, in which kind of gun is the ball most likely to be placed inaccurately by the process of loading? We will suppose that you have the best of muzzle-loaders—a target gun provided with a false muzzle and starter. The ball is placed on the muzzle and forced in the length of the starter—say three inches. The rod is then applied, and the ball driven home. Now, there are several circumstances which may occur in the operation, any one of which will interfere with the accuracy of the operation. First, it is evident, that if the ball is started or enters the muzzle at all inaccurately, it is by the very process of being forced in, fitted to the bore in that inaccurate position, and will continue so all the way down. Second, though it may be started correctly, yet, when the rod comes to be applied, it may be shoved or turned so as to incline to one side; and as the rod, having a metallic ferrule or socket on its lower end, is not allowed to fill the bore, lest it should abrade or scratch the inside of the barrel, such displacement of the ball is certainly possible, if not quite likely to happen. On the other hand, the case of the metallic cartridge, being made by machinery, is, or ought to be, perfectly straight and cylindrical. The ball is united to the case by machinery in such a way that the two are made as straight and accurate as though composed of a single piece. This is then inserted in the chamber at the breech, where it fits so snugly that there is no chance for it to be moved in the least out of line, and hence the axis of the ball must coincide perfectly with the axis of the bore. Now, I submit that, when this is done, the chances for accuracy are decidedly in favor of the breech-loader—that there is more certainty that it will be accurately loaded than there is that the other will be. But there is another idea to be kept in view here (for, remember, it is which is best as an army gun that is to be decided), and that is the fact that, however nice the false muzzle and starter may be at target and turkey matches, they cannot be used on the battle-field, and that, therefore, we must rely entirely upon the rod as a means of placing the ball accurately in the muzzle-loader. Not only is this true of the battle-field, but it is also practically true with the hunter; whereas the accuracy of the breech-loader is equally applicable in all cases—at the target, in the forest and on the battle-field.

Third, It is objected that the breech-loader is not cleaned by the process of loading, as the other is, and hence is not likely to shoot as well—that it cannot be relied on for a "string" of shots. It is no doubt true that the cleaner the bore is kept, the better the gun will shoot. But my experience convinces me that a breech-loader does not foul any more than a muzzle-loader. The idea that forcing down a ball cleans the bore, however correct it may appear theoretically, is not so in fact. If so, why is it that, after a few rounds, the barrel becomes so foul that the ball cannot be forced down without difficulty—often bruising and jamming it out of shape—a circumstance which, of itself, must prevent accurate shooting? Instead of cleaning the bore, by forcing down the ball, you simply force the residue, which was formed by the previous discharge, down the bore, and add it to that of the next discharge; and so on successively, until finally the barrel becomes so foul that the ball cannot be shoved down, the rifling soon being literally filled with hard residue thus accumulated; and hence it is that sportsmen and hunters almost invariably carry with them a "wiper" with which they clean their gun after every few discharges. Now, all guns will foul more or less every time they are fired; and, as they must be wiped out occasionally, I claim that, even here, the advantage is with the breech-loader, because, being open at both ends, the barrel can be wiped out much quicker and cleaner than in the muzzle-loader. Shoving a wiper down the bore of a muzzle-loader has little more effect in cleaning it than forcing down the ball has; and hence it is that the process has to be repeated over and over again, and fresh cloths or other material applied to the wiper, until, by this repeated process, the residue in the barrel is absorbed or taken up by contact with the wiper, and thus extracted from the barrel; whereas, in the breech-loader, the wiper or brush, being shoved through the barrel, carries the foul matter with it, and thus relieves the barrel at once, in a tithe of time occupied in cleaning the other. There is still another view of this matter, which it is important to bear in mind, and that is, that it is usually the first dozen or so of shots that decide a battle—rendering the attack or defense successful or unsuccessful, according as the one or the other side pours in the most rapid and effective fire; and, as there is no pretense that the breech-loader will not remain sufficiently clean for effective firing up to several dozen rounds, at least, its decided superiority over the muzzle-loader, in such a case, is beyond the possibility of dispute. And even the anxiety of the "profound" head of the Ordnance Bureau to have our army return to the old smooth-bore musket, with the spherical ball and buck-shot, cannot be urged as an objection against the breech-loader, because the ball and buck-shot can be used in that just, as well as in the other.

In your statement, the men in the army provided with breech-loaders are represented as being dissatisfied with them. I do not know of any men, except the sharpshooters and mounted men, who are provided with them; and, from a personal acquaintance with quite a number of them, I find just the reverse to be true. I have talked with many of the former in hospitals here, and in every single instance I have found them enthusiastically in favor of the breech-loaders—with not a single exception. No such service has been rendered in this war as by the sharpshooters on the Peninsula and at Fredericksburgh; at which latter place a single company, armed with Sharpe's rifles, absolutely kept a rebel battery silent for hours, and at a distance, too, at which the ordinary army rifle would have been useless! That certainly don't prove that muzzle-loaders are superior; and the fact that many of the wounded men of that corps carried their breech-loaders with them to the hospitals, and insisted that, when they were discharged, they would carry their "pet" home with them, even though they had to pay full fifty dollars for it, if the Government would consent, certainly does not look as if they were dissatisfied with breech-loaders. If there has been, anywhere in this war, better shooting or more effective service than has been furnished by the Sharpe's rifle, in the hands of the sharpshooters, I have yet to hear of it. It may be that the two companies armed with the 40-lb. muzzle-loaders have made some better shots; but, if so, it was owing to the fact that they were provided with telescopic sights, while the others had only the open sights, and not to the fact that they used muzzle-loaders; but even that I have not yet heard asserted, though I should naturally expect such to be the fact. Instead of their being dissatisfied with breech-loaders, I have every reason to believe that, if the question were submitted to the entire army to-day, it would decide, by a vote of four to one, in favor of breech-loaders. If any one desires to test the question, let the proposition be made to exchange the breech-loaders in the hands of the sharpshooters and mounted men for muzzle-loaders; and I venture to say that we should have such a response at once as would settle the question in short order! Who does not recollect the dissatisfaction—amounting to serious trouble—among the Berdan sharpshooters, when camped in the vicinity of this city, because they were not provided with breech-loaders as promised? Who has forgotten the charge of the Fremont Body Guard at Springfield, and who does not know that their success was owing to the fact that each man was armed with one Colt's rifle and two Colt's revolvers—thus giving eighteen successive shots per man without stopping to reload—and that each man had the disposition to use them, even though some rebel should be "unconstitutionally" hurt?

Again, if it be true that the men are dissatisfied with breech-loaders, why and how is it that we see the newspapers of the day filled with such items as the following:—

Colt's Patent Fire-arms Manufacturing Company, at Hartford, Conn., has sixteen hundred men constantly employed on arms for the Government. At Sharpe's Rifle Factory about five hundred men are employed. The Government takes all the pieces made.

To the above list should be added the extensive factory recently established for manufacturing the Burnside rifle. Now, how is this? Is it another of the "bright ideas" of the head of the Ordnance Bureau to employ all these establishments night and day to furnish the army with arms that the men are dissatisfied with, and which, at the same time, cost twice as much as the one they are intimated as preferring? The statement does not look reasonable, to say the least.

I do not wish to be understood as advocating the Sharpe's rifle as being the best; on the contrary, I believe there are several other kinds preferable to that for army use, and much cheaper. In fact, I am satisfied that our present army rifles might be converted into breech-loaders in every way equal, and, in several respects superior, to that, at an expense not exceeding two dollars apiece—thus rendering our army at least five times as effective as at present! Whenever common sense and reason shall control our Ordnance Bureau, instead of red tape and old fogyism, I shall expect to see this done, but not till then.

RIFLEMAN.

Washington, D. C., April 28, 1863.

[Our correspondent does not seem to have appreciated the letter and spirit of our article to which he refers. During the last fourteen years we have tested and seen others test quite a number of breech-loading rifles, and we have never been without one during this entire period. Arguments can always be advanced on two sides of any question, and mere opinions do not prove anything. The greatest advantage of a breech-loading fire-arm is not clearly pointed out by our correspondent. It consists in the ease and convenience of loading. For mounted rifle corps this is self-evident, because it is so difficult to use the ramrod on horseback. And, in an engagement of several hours' duration, the labor of using a long ramrod in loading is very severe. Rapidity of fire without accuracy is a disadvantage. It is well known that, in the beginning of an engagement and during its excitement, soldiers generally fire too rapidly even with muzzle-loaders, hence the small number of killed and wounded in proportion to the number of rounds fired. The experience of officers and men in the army who have used both breech-loaders and muzzle-loaders, also that of hunters and expert marksmen, would be valuable in settling this important question. The rifle which possesses most advantages should be used for the army. We made no such broad statement as that attributed to us by our correspondent, that "the men in the army provided with breech-loaders were dissatisfied with them." We said:—"We have understood, from verbal reports, that the large number of breech-loading rifles furnished to the sharpshooters in our army have not given satisfaction. Reliable information on this subject would be instructive." This is a very different statement; it casts a doubt on the accuracy of such reports.—EDS.

Curing Butter.

MESSRS. EDITORS:—On page 260, current volume of the SCIENTIFIC AMERICAN, there is an article headed "Curing Butter," in which ten drams of saltpeter, &c., are given to every sixteen ounces of butter. Ten drams are an ounce and a quarter, sufficient—when taken into the stomach in proportion with the ordinary bulk of butter eaten at one time—to be decidedly poisonous. This may produce harm, and I have taken the liberty of calling attention to it. Ten *grains*, it seems to me, would probably be enough.

R. H. L.

Baltimore, Md., April 22, 1863.

The article referred to by our correspondent was taken from, and credited to, the *Canadian Agriculturist*. Ten drams avoirdupois ($\frac{10}{16}$ths of an ounce) of niter was probably meant. This quantity is large, but we are unacquainted with a single case which would prove it to be "decidedly poisonous." Perhaps there is no safer authority to follow than Professor Johnstone, for reliable information about butter. He states that the butter made in one district of country differs oftentimes in quality from that produced in another, even though the same method of manufacture be adopted. "In different seasons also," he says, "the same farm will produce different butter. Thus it is said that cows which are pastured yield the most pleasant butter in May, when the first green fodder comes in; that butter is generally the hardest when the animal lives upon dry food, and

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that autumn butter is best for keeping. These differences may all be ascribed to varieties or natural differences in the pasture upon which the cow is fed. The constitution of the animal is also known to affect the quality of the butter. But from the same milk, and even from the same cream, by different modes of procedure, different qualities of butter may be obtained. For the production of the best butter it is necessary that the cream should be sufficiently sour before it is put into the churn. Butter made from sweet cream (not clotted) is neither good in quality nor large in quantity, and longer time is required in churning. When the process of churning is continued after the full separation of the butter, it loses its fine yellowish, waxy appearance, and becomes soft and light colored. Much also depends upon the temperature of the milk or cream when the churning is commenced. Cream, when put into the churn, should never be warmer than 55° Fah. It rises during churning from about 4° to 10° Fah., above its original temperature. When the whole milk is churned, the temperature should be raised to 65° Fah., which is best done by pouring hot water into the churn, while the milk is kept in motion. Cleanliness is also peculiarly necessary to the manufacture of good butter, as cream is remarkable for the rapidity with which it absorbs and becomes tainted with unpleasant ordors."

Butter contains 68 per cent. of a solid fat called margarine, 30 per cent. of butter oil, and 2 per cent. of butyric, caproic and capric acids. These proportions differ slightly at different seasons. Margarine, which exists so largely in butter, is also the solid fat in the human body and in olive oil. It is white, hard and brittle, and may be kept for any length of time by itself, but in the state of its mixture in butter it is apt to absorb oxygen from the atmosphere and become changed into butter oil and the fatty acids. It appears to be a natural food for the human race, as it enters directly into the constitution of the human frame. Butter oil is of a yellowish color; it has the taste and smell of butter, it mixes with alcohol and dissolves in a caustic solution of potash, forming soap. The oleic acid of butter, when pure, is colorless and transparent, and is remarkable for the rapidity with which it absorbs oxygen from the atmosphere. It is to the capric and caproic acids, which exist in such small quantities in butter, that it chiefly owes its disagreeable odor when it becomes rancid.

As usually made, butter frequently contains some milk-sugar and casein, which are also constituents of milk. A very minute quantity of casein or cheesy matter also induces chemical changes in butter, producing butyric and other acids. In making butter for keeping, it should, therefore, be freed as completely as possible from casein. In many dairies this is done by washing in water, in others by kneading and pressing only. The washing is the most effective method, and is most generally recommended for butter that is to be eaten fresh. In some dairies, however, it is carefully abstained from, especially in the case of butter which is to be salted for long keeping. In curing the butter, Professor Johnstone states that the air should be excluded from it as completely as possible, and the sooner the salt is applied and the whole packed close, the sweeter the butter is likely to remain. With respect to the substances used for curing it he says :—" It is not uncommon to employ a mixture of common salt, saltpeter and sugar. When the butter has been washed, the cane-sugar may supply the place of the milk-sugar, which the butter originally contained. The salt should be as pure as possible—free from lime and magnesia. The quantity usually employed is from $\frac{1}{24}$th to $\frac{1}{28}$th the weight of the butter. The point to attend to, in salting butter, is to take care that all the water which remains in the butter shall be freely saturated with the salt. If you exclude the air, the presence of a saturated solution of salt will not only preserve the cheesy matter from undergoing decay, but will render it unable to induce decay in the sugar and fat which are in contact with it. Such a rigid precaution is really necessary to prevent the evil influence of only half a pound of cheesy matter in one hundred pounds of butter."

The following is one method of salting which has been practiced with success :—" When taken from the churn the butter is never washed, but put into a clean tub and worked with the hands until all the milk is squeezed out. Half the quantity of salt is then added and thoroughly mixed with the butter, and in this state it is allowed to stand till next morning, when it is again worked over, the brine squeezed out, and the remainder of the salt added. It is then closely packed in firkins, some salt sprinkled on the surface, the firkins closely covered up and set in a cool place. Half a pound of the best salt, and nothing else, is employed for thus curing fourteen pounds of butter." Neither sugar nor saltpeter are positively necessary in curing butter.

Discovery of a Tin Mine in Missouri.

Messrs. Editors :—It gives me pleasure to inform you, and—through your very valuable journal—the American people, of my recent discovery (in connection with Dr. A. C. Koch, of this city,) of a very extensive and valuable tin mine in the State of Missouri.

From the assays of the ores, which I have made myself and have had made by others, we find the ores will yield, from the tin stone, from two and a half to ten pounds of tin to one hundred pounds of ore. The ores treated thus far have been taken from near the surface and downwards to about thirty feet—the greatest depth to which we have yet sunk. Four or five shafts have been sunk on the property, varying in depth from six to thirty feet. In all of them tin ore was struck within a few feet of the surface, and they are all going down in it, none of them having gone through the lode, and it may reasonably be expected to increase in richness as it increases in depth.

The soil seems to be filled with the tin ore let loose from the decomposed stone by the action of time, and at some of the openings an overlaying of asbestus, from one to two inches thick, is found at about eighteen inches from the surface. Judging from the partial surveys thus far made, from the outcroppings and the general geological formation of the locality, which is primitive in an extraordinary degree, the tin ore must be in abundance—more abundant than iron ore at Pilot Knob.

The lode has a northeasterly and southwesterly bearing, extending nearly one mile, and the two deepest shafts are about three-quarters of a mile apart. The tract embraces about one thousand acres, but the ore is not thought to underlie the whole of it. The great body of the ore lies nestling in a beautiful valley at the foot of three mountains, whose bases approach each other on a gentle slope, and at the head of a ravine running up from Saint Francois river and Stout's creek among the mountains. These mountains are separated by pretty rivulets running down their sides and gathering into one at their bases, making a fine and enduring stream of water, flowing the whole length of the tract, and in abundance for all mining purposes. The ore doubtless extends under what is called the Blue Mountain, if it does not also under the other two mountains.

A company has already been formed, and will go into operation during this year, with every prospect of eventually producing enough tin to supply the American market. Hugh M. Thompson.

St. Louis, Mo., April 20, 1863.

[We have frequently directed attention to explorations for tin veins in our mineral regions. Hitherto all our tin has been imported from England and the Indian Archipelego. We hope that this tin mine may not disappoint the expectation of our correspondent and others who desire to see America rendered entirely independent of foreign sources for a supply of this useful metal.—Eds.

Armor for Ships of War.

Messrs. Editors :—In the Scientific American, I find several statements respecting the iron clads of the Mississippi flotilla, which I beg permission to correct. The article in which they are contained is entitled "Armor for Ships of War" (page 249 current volume of the Scientific American), and advocates the use of thin iron plates with an india-rubber backing. You stated that "the *Conestoga* and *Lexington* were plated with solid iron 2½ inches in thickness, yet they were completely riddled in the attack on Fort Henry." The *Conestoga* and *Lexington* were formerly transports on the Ohio river, and were altered into gunboats. They have never been plated with iron, neither were they "completely riddled" at Fort Henry, as they were not brought directly under the batteries of the fort as the iron-clad vessels were. You also say that the 2½ inch-plating on the Western gunboats has been penetrated repeatedly, and cite the engagement between the *Carondelet* and the rebel ram *Arkansas*, and the attack of the *Benton* at Haines' Bluff. This is equally incorrect. Having built eight of the iron-clad gunboats of the Mississippi flotilla, I have felt more than ordinary interest in knowing how they have withstood the batteries of the enemy. These eight vessels were all plated with 2½-inch solid iron, placed at angle of 45 degrees. They are the *St. Louis*, *Carondelet*, *Cincinnati*, *Louisville*, *Mound City*, *Pittsburgh*, *Cairo* and *Benton*. Up to the present time not one plate of this iron has been penetrated on any one of these boats, although they are marked by innumerable scars. All of the casualties that have occurred on them have resulted from projectiles that have entered the port-holes on them, or that have penetrated portions of the vessels not covered with 2½-inch plating. My information on this subject is derived from personal inspection of the plating soon after the engagements at Forts Henry and Donnelson, and from officers of the flotilla subsequent to the bombardment of Island No. 10. The *Carondelet* received the fire of the ram *Arkansas* while the vessels were almost touching each other and, although the plating was considerably injured, I am reliably informed that the shot did not go through it. The pilot-houses on all except the *Benton*, were originally covered with plating only 1½ inches thick, and placed more vertically than the 2½-inch plates. It was in one of these that Flag-Officer (now Rear Admiral) Foote, was wounded by a shell which penetrated it in the engagement at Fort Donnelson. His vessel, the *St. Louis*, was struck 61 times in the attack on that fort.

That vessel, the *St. Louis*, now called the *DeKalb*, was, I believe, the first iron-clad war-vessel ever built on this continent, and the first that ever fought a battle on this side of the world; having engaged, with her consorts, the batteries at Fort Henry on the 6th of February, 1862. She was launched at Carondelet, near St. Louis, on Oct. 12, 1861. While perfection was not to be expected in our earliest efforts, it is gratifying to know that we have lost but one of the first eight iron-clads ever built in the United States (the *Cairo* was sunk in the Arkansas river, by the explosion of a torpedo under her); that we are profiting by the faults discovered in them; and that their 2½-inch solid plates have thus far protected them against rebel batteries. James B. Eads,

St. Louis, April 27, 1863.

[The main facts in the article above alluded to, were obtained from a pamphlet dated Feb. 25, 1863, and signed by W. D. Porter, Commodore U. S. N., and J. L. Jones, Esq., St. Louis, memorializing Congress on the subject of thin plating backed with rubber. The other portions not compiled from this source, were obtained from correspondence written at the West, and if the statements are incorrect we have been misled. The telegraph reports that the *Benton* received a shot through her plating, which killed one or two men on board, on the occasion of her passing the batteries at Vicksburgh, to join Farragut's fleet below. Is this statement also incorrect? Our correspondent has omitted to notice that the article is quoted; and his assertion that the use of thin plates, backed by rubber, is advocated by us, is also incorrect. We would call his attention to the closing paragraph in our article on "Armor for Ships of War."—Eds.

An Editor's Trials.—As an illustration of the trials of editors, "Irenæus" of the New York *Observer* says :—"The letters coming to the editor, asking his assistance, are so many that he might reasonably employ an agent on a salary to do the work. We made mention, some time since, of a new corn that has been introduced into this country. One of our distant subscribers wrote requesting us to buy an ear of the corn for him, and from week to week to shell a few kernels of it into the *Observer*, until the whole was sent! In this way he would save the expense of postage or express. Imagine, my dear friend, the happy editor selecting one man's paper out of a vast mail list, and cheating the Government by putting a weekly grist of corn into it!"

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Improved Cultivator and Seed-Sower.

As the spring opens, and the sowing season comes around again, farmers will do well to bestir themselves and get their crops underway, else they will be left far behind by their more enterprising neighbors. The seed-sower and cultivator herewith illustrated is of novel construction, and is designed to sow the grain broadcast. In the perspective view, Fig. 1, the frame is jointed at A, and moves up or down, as the lever, B, is elevated or depressed. The seed-sowing apparatus is driven by the wheel, C, from another on the main axle. Fig. 2, in section, explains the machine and its operation more clearly. The lifting-bar, B, is attached to the frame by short chains, thus giving a free and independent motion when passing over obstructions.

Fig. 1.

TYLER AND JONES'S CULTIVATOR AND SEED-SOWER.

Fig. 2.

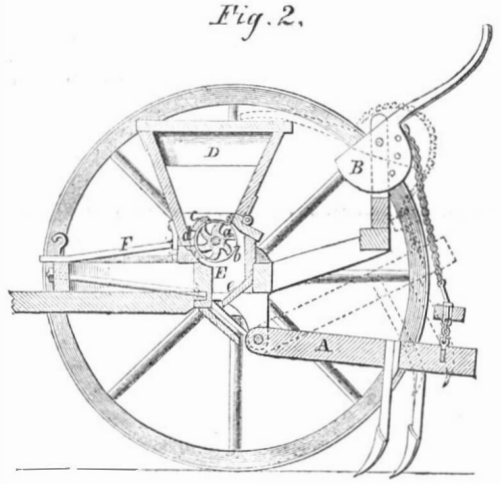
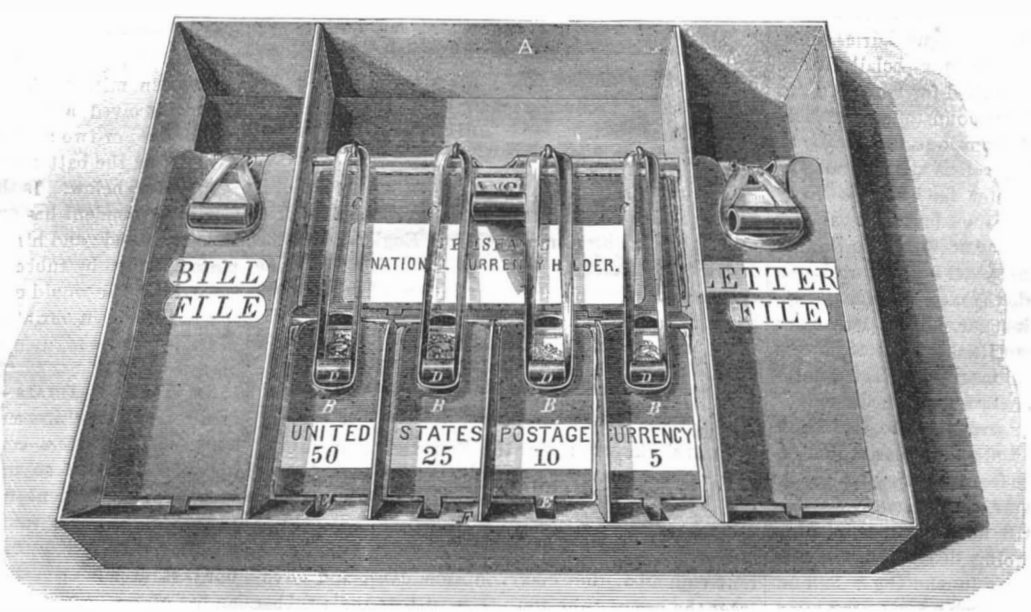


Fig. 2 shows the arrangement of the seed-distributing apparatus. This consists of the box, E, connecting with the upper one, D, on which the driver sits. This box has a shaft running through it, provided with a cylinder. The shaft has a disengaging apparatus attached to it, which is formed by two collars with ratchet teeth; these are thrown into or out of connection with each other as desired, so as to prevent the distributing gear from working, when the machine is traveling to the field to be sown.

There is a lever, F, connected with the shaft, for the purpose of moving it horizontally. The extreme end of this lever projects over the frame, and may be secured by a pin working in a series of holes at any point. The object of thus adjusting the shaft, will be presently shown. The shaft has further attached permanently to it a cylinder; on this there are a series of curved buckets, *a*; on the buckets there is a head, *b*, made of a circular plate having curved slots in it, corresponding to the shape of the buckets. In the center of the head there is a hole through which the shaft carrying it passes, and is allowed to slide freely therein. The curved plate, *c*, covers the upper part of the cylinder and buckets, and has a square opening, *d*, made in it; the inner surface of the plate is not uniform. There is a longitudinal recess made in it to receive still another plate, called a gate, intended to slide laterally in the plate, *c*. This gate is provided with a ledge on its inner side, which fits in a groove made in the cylinder itself; the gate is thus connected with the cylinder so as to move with it. The head also rotates with the cylinder, and is prevented from slipping on it by having its periphery fitted in a groove in the inner surface of the curved plate, *c*, near one end of it. In the bottom of the seed box there are placed double-inclined planes, which form a bottom for the same, and cause the seed to be conducted to the opening, *d*, in the curved plate, *c*; a space being allowed for that purpose between the ends of the inclined planes. The operation is as follows:—The machine being drawn along, the shaft of the seed-distributor is rotated by a cog-wheel on the main axle, when the seeding apparatus is in gear. The seed passes through the opening into the curved plate and the buckets; as these rotate with the shaft they catch the seed and carry the same upward and discharge it as they pass over behind the shaft, on to the inclined bottom, *e*; the quantity of seed discharged being regulated by moving the shaft laterally, so that the gate which moves with the cylinder may cover more or less of the opening. This plate also performs another important function, as it prevents the seed from being broken by clogging or jamming in the machine; it leaves a space between the edges of the buckets and the inner surface of the cylinder. The inclined bottoms are corrugated, and as the seed strikes them in its descent, it falls on the ground and is covered in by the teeth following after.

The patent for this invention was procured through the Scientific American Patent Agency on August 12, 1862, by W. M. Jones and S. E. Tyler, of Horicon, Wis.; further information may be obtained by addressing the inventors as above, or D. W. Hall & Co., manufacturers, at the same place.



ISHAM'S CURRENCY AND BILL HOLDER.

Currency and Bill Holder

This illustration represents a new method of holding the postal currency so that it can be readily removed as required for business purposes; it consists of a tin box, A, divided into a number of compartments of various sizes in which the notes of the several denominations are deposited. These compartments are furnished with small plates, B, to which the elastic straps, C, are connected by being passed over a hook on one end of the box and a projection, D, on the plate itself. The opposite ends of the plates have a small tongue, E, which is dovetailed into the slot, F, and while it serves as a hinge for the plate to work on, also permits it to rise as the pile of notes below is increased in bulk. These are the principal features of the holder. The bill file on the left and the letter-holder on the right, sufficiently explain themselves, and they are similarly furnished as regards the mechanical arrangement with the other compartments. Additional spaces are left at the ends of the currency-holder in which to deposit pennies or silver (when there happens to be any in use) as may be desired.

This currency-holder is the invention of George B. Isham, of Burlington, Vt. An application for a patent is now pending through the Scientific American Patent Agency.

A Gold Model of the "Roanoke."

A gold model of the iron-clad frigate *Roanoke* was on exhibition at Bailey's, on Chestnut street, a few days since, and attracted considerable attention. It was made by Mr. J. D. Benton, of Wilmington, Del., and is eighteen inches in length, three and three-eighths inches in width and a trifle over two inches in depth. There are nineteen ounces of fourteen-carat gold used in the construction. All the details of the turrets, hatches, guns, smoke-stacks, man-ropes, &c., are made to a scale and are perfect in form. A musical instrument is located below the spar-deck, and when in motion the three turrets revolve and the propeller is worked, and, when placed in the water, she goes ahead in fine style. The musical arrangement plays three tunes—"Star-spangled Banner," "My Mountain Home" and "My Old Kentucky Home." The gold used cost over $1,500. Some of Mr. Ericsson's friends have engaged Mr. Benton to build a gold model of a *Monitor* battery, the gold in it to be worth $5,000.—*Philadelphia Press.*

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NEW YORK, SATURDAY, MAY 9, 1863.

PLANTING AND CULTIVATING SORGHUM.

In the treatise on "Sorgho" of Isaac A. Hedges—who is said to have been the pioneer and practical experimenter with the Chinese sugar-cane in the West—he states that sufficient attention has not usually been given to the preparation of the soil and planting of the seed. The soil should be ploughed very deep, as the roots sometimes penetrate three feet downwards. A free use of lime and wood-ashes is advantageous to the crop. It has been recommended to plant the seed in rows running north and south, but as the westerly winds are most destructive in laying the standing crop, rows running east and west should be made, because they will stand up much better against such gales. The Chinese cane may be transplanted like cabbage plants, and early crops may be raised by starting hot beds and transplanting in May or June. Or when the seed is planted in the field, missing hills may be supplied with plants taken from a prepared bed. Every farmer who plants sorghum should pursue this method. If planted in hills, these should be about four feet apart; if in drills the seeds should be about six inches apart. Careful planting is the first important step to secure an early and a paying crop.

Upon the subject of treating the seed of the imphee Leonard Wray, who introduced it from South Africa, says:—"I have sometimes soaked it for twenty-four hours in warm water previous to planting, in order to expedite its germination, as seeds so treated will in warm moist weather, be up in four days afterwards; whereas, being planted (during showery weather) without this assistance, they usually take six or seven days for sprouting; and if dry weather sets in after planting, it will be ten or fourteen days before they appear above ground. The practice of soaking I hold to be a good one." An argument in favor of soaking the seed is also advanced by Mr. Hedges; he says:—"I would especially caution farmers against planting seed without first having tested its capability of germination; then having satisfied themselves on this point, let care be taken not to plant too thickly." Shallow planting is also recommended. In no case should the seed be set more than an inch in depth, and half an inch is sufficient. When set deep the seed is liable to rot should rain occur immediately after planting. In all cases it should be planted in ridges—never in furrows, so that it may receive greater warmth from the sunshine and not be so liable to be saturated with moisture during wet weather. About from eight to ten seeds are recommended for each hill.

After the plants of the cane are up, an occasional top-dressing of plaster and lime is suggested by Mr. Hedges. The best crop of sorghum we ever examined in New York was planted on loamy soil sloping to the south, and the plants had received a top-dressing of manure from the hen-house. A prize was warded to this crop by one of the county agricultural societies. The custom of hilling around the rows, as in corn culture, is advantageous; and early cultivation between the rows to keep down the weeds is positively necessary to secure a good crop.

THE *Genesee Farmer* says:—In 1616 half a pound of hops to a barrel of beer was deemed sufficient; now, from five to eight pounds are used in making a barrel of "pale ale."

SENSELESS NOMENCLATURE.

An exchange paper says that a new name has been invented and attached to a textile fabric introduced some months ago; the title in question is "Fibrilia." When are we to have a reform on the subject of proper names? When will people learn that a high sounding cognomen confers no desirable eminence, nor any value upon its recipient. Every person has an undoubted right to bestow any hideous appellative he may fancy upon his children or his personal property of whatever description, but there is not the slightest propriety in tormenting the public eye and ear with titles without sense or euphony. The name of a new fabric is something that will endure forever, provided the fabric is good; and how, under such circumstances, an inventor could consent to baptize the product of his ingenuity with an appellation as senseless as it is absurd, seems incredible. If he have a good surname let him bestow that upon the fabric, but let us have no "Fibrilia." We read only the other day that the good citizens of Washoe (Nebraska) had decided to call a new township in their territory by the name of "Argentum City." Whereupon a grave discussion ensued in the local papers as to whether the title belonged to an ancient city, or was like some stocks in that portion of the world—a fancy article; the difficulty being finally settled by the decision that *argentum* was the Latin term for "silver," and consequently applicable.

Synonyms of proper names are not uncommon. Two steamers recently running upon Lake Erie, both belonging to one company and one line, had similar names—the one was the *City of Buffalo*, and the other the *Western Metropolis*. The word "metropolis" might apply to any collocation of shanties between here and the Rocky Mountains; in this case, however, an obvious honor was intended to the incorporated city of Buffalo itself.

The worst evil of this system of applying names indiscriminately is that the towns they are bestowed upon are generally anything but suggestive of the titles which dignify them. "Silver City" can well be imagined, there is no necessity to describe it; so also "Dead Man's Bar," "Shirt-tail Bend," "Murderer's Gulch," and a thousand others—all hideous and repulsive—adorn and "beautify" some of the most degraded places in California. In the State of Connecticut there are little hamlets, or nuclei of houses on the outskirts of large villages, which have the most singular titles. "Macedonia" and "Pigtail," are the names of two opposite points of one village in the State alluded to; and "Skunk's Misery" and "Hardscrabble," in New Jersey, are titles expressive, doubtless, of the refinement of the inhabitants who dwell therein. It is only a short time since nearly every other steamer in the mercantile and naval service, and at least one locomotive on every road in the country, was called either an *Arctic* or a *Niagara*, or a *Mohawk*, and it is with great pleasure that we observe that most of our new gunboats have names which reflect credit upon those who suggested them. Our country is full of beautiful Indian names, sole relics of those mighty races who once held undisputed sway and dominion over the broad acres which compose it; but even these are only limitedly adopted, and we hear such gross terms as "Porkopolis" applied to one of the most attractive cities on the continent.

If we are at a loss for nomenclature, and must have some tongue-furling high-sounding name to confer upon our towns, steamers, horses, or what not, let us at least avoid such solecisms as have been enumerated, and consult the ancient mythologies for appellatives, at once beautiful and suggestive. Good names are to be had there for the seeking, and there are but few that have not the sweetness and musical terminations of the Greek tongue clinging as firmly to them as the vine to the oak. Let us adopt these for ships and locomotives at least, if for nothing else, if we cannot have our native Indian designations, and we shall be spared the pain of having our ears shocked by any such barbarisms as the ones hereinbefore mentioned.

SOME silk-growers in the south of France have determined to import from China and Japan an immense quantity of silkworm spawn, in order to improve the native breed, which is deteriorated by chronic disease.

APPRENTICES AND EMPLOYERS.

In days—happily for the credit of mankind—long since passed, an apprentice was regarded chiefly as a fit subject for the abuse and spleen of the hard-hearted master. No matter how trivial the offense or how slight the shortcoming, the word and the blow, and oftener the latter without the admonition, followed closely on the transgression. The life of the apprentice was a constant scene of starvation, overwork, and personal indignity, and the press of remote periods had usually a column or so, in which an individual was depicted as fleeing from the wrath behind him, with a bundle and a stick—his sole earthly possessions. "Walked away, too lazy to run," was the common heading, and "one cent reward" was offered for the apprehension of the fellow, as the most caustic satire that could be uttered respecting the value of the fugitive's services.

Hogarth thought it not beneath his eminent talent to illustrate the career of the idle apprentice, and he did it in such a powerful manner that it awakened universal attention. The regeneration of the apprentice system cannot, of course, be traced to the publication of those cartoons, but it is very certain that, in this country, a much needed and desirable reform has been gradually inaugurated, until it may be safely said that the artisan's assistant is more favored here than elsewhere. From the position of a slave and a hireling, he is elevated to an equality with his master, or more properly speaking, his employer, for in this country no man is master except the slaveholder. From a companionship with low associates and lewd fellows of the baser sort, the apprentice has been rescued, and now there are few places of honor and trust to which a faithful one may not aspire.

In former times, when the arts were as yet undeveloped, the idea prevailed that a trade which limited the number of its members enhanced its value in the community, so that by observing the law rigidly, the organization could demand any compensation it chose. Were it possible to do this, if the laws of supply and demand were variable to suit circumstances, and if the seasons of the year were all equally busy, then some such arrangement might be feasible, but it is not, for the reasons set forth. When apprentices were bound for a certain period, they almost invariably ran away before its expiration. The young man seeking to acquire mechanical knowledge is no longer bound, legally, to a stated period, but enters the handicraft he chooses, in most cases, of his free will and accord. He signs no parchment rolls, but his agreement is none the less binding or compulsory upon him on that account. Certain instances have come to our knowlege wherein young men have broken faith with their employers, and violated the confidence reposed in them, and these cases are the more flagrant because, in pursuing such a course, the apprentices damaged their own characters for integrity and veracity. When a manufacturer takes a youth into his service, he does it at a considerable loss for the first two or three years, expecting to remunerate himself in the closing term of the novice's education, by the skill he may have acquired. When, therefore, the apprentice violates his verbal pledge, he is, in effect, dishonest, because he carries away with him a portion of experience for which he has rendered no equivalent. Extraordinary cases sometimes happen, no doubt, which admit of much extenuation, such as those wherein the self respect of the apprentice will not brook the indignities to which he is subjected, but these are of rare occurrence, and we mention them with hesitation lest we furnish a specious excuse for some young man desiring to defraud his employer of his time. Our manufacturing mechanics and firms are, as a class, extremely liberal in their provisions for the welfare of the young men under their care, as it is for their interest to be; and we admonish all young men who are disatisfied with their condition and treatment, to remonstrate, if necessary, quietly and respectfully, and take in all cases the advice of those competent to decide for them, before taking hasty steps which they will be sure to regret hereafter.

COMMANDER WORDEN, whose eyesight is yet weak from injuries received on the *Monitor*, has been ordered to New York to assist in fitting out iron-clads.

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THE SAFE LOAD AND STRENGTH OF IRON.

A very able and suggestive paper has lately been read before the Society of Engineers, London, by Mr. Zerah Colburn, on "the relations between the safe load and ultimate strength of iron." When it is taken into consideration how extensively iron is now employed for engineering purposes, such as in bridges, boilers, buildings, &c., positive knowledge respecting the safe load which it can bear for a long period of time is of the first importance. Mr. Colburn forcibly points out the deficiency of knowledge on this subject, and suggests that protracted, accurate and repeated experiments be made to ascertain the safe load which iron will sustain permanently. He states that much difference of opinion prevails among engineers respecting the safe working strength of iron, and that its permanent supporting power is variously estimated at from four-tenths to one-tenth of its breaking strength. In the application of this metal to railway structures, the late Mr. Glynn recommended that a cast-iron bridge should never be loaded beyond one-tenth of its ultimate strength. Mr. R. Stephenson and several other engineers considered that a ratio of one-sixth of the breaking load was safe; while Brunel held that from two-fifths to one-third was allowable. Thus one of these engineers would allow 33 tuns as the safe load upon a girder that would just bear 100 tuns, while the second would allow 17 tuns as the load, and the third —Mr. Glynn—only 10 tuns. The British Board of Trade limits engineers to a maximum tensile strain of 5 tuns per square inch in designs for wrought-iron railway bridges. The breaking and crushing strength of iron is well known, but its capacity to bear loads for long periods of time in permanent structures is *not* well known; hence the different opinions and practice prevailing among engineers.

Mr. Colburn says:—"In employing iron in any structure where it is subjected to strain, we seek to keep within its limit of elasticity; yet, not only have we but a comparatively small number of recorded experiments to show us what this limit is, even under a single and temporary strain, but we have the result of M. Vicat's experiments to show us that we cannot depend upon anything like this limit under a long-continued strain. What experimental knowledge we have goes to show that the original elastic limit of iron is greater when hammered than when rolled; but we are unable to count with any degree of certainty upon the ultimate superiority of hammered iron in this respect after long-continued strain."

An iron bar or girder, which supports a certain load for a week or a month, will become gradually weaker if that load exceeds its limit of elasticity; hence the necessity for knowing the exact load which it will bear a great length of time. Mr. W. Fairbairn made an extensive series of experiments between the years 1837 and 1842 to ascertain how long bars of cast iron would support loads equal to about nineteen-twentieths of their breaking weight. By taking care to prevent any vibration about these bars several of them continued for five years to support this load. Their deflection steadily increased, however, during the whole time, and some of them broke with one-twentieth of their original breaking weight. It is also known that iron which has withstood a great proof strain oftentimes breaks down afterwards under a much less strain.

Mr. Colburn raises a warning voice with respect to increasing dangers from the explosions of locomotive boilers by carrying high pressures of steam. He says:—"Iron is perhaps more severely strained in steam boilers than in any other structures. In the case of locomotive engines there is a disposition to employ still larger boilers and to carry still greater pressures. With 50-inch boilers, formed of $\frac{7}{16}$th-inch plates, double riveted and carrying (as is not now unusual) from 130 pounds to 150 pounds pressure, there is at the higher limit a circumferential strain of 5½ tuns per square inch at the joints and a longitudinal strain of nearly 2 tuns per square inch along the whole length of the boiler; the resulting strain at the joints being nearly 6 tuns per square inch. This strain is constantly maintained with plates ranging from 21 tuns to 24 tuns in strength and under all the contingencies of corrosion, incessant vibration and occasional sudden exaltations of pressure due to the instantaneous production of steam upon overheated tubes or plates. In many cases we have 4-feet boilers with $\frac{3}{8}$-inch plates, single riveted and worked at 120 pounds—corresponding to a strain of at least 6½ tuns per square inch at the joints of the boiler when new; the circumferential and longitudinal strains being both taken here into account. Put under this strain when new, many locomotive boilers are worked in all for from ten to twenty years, and often from three to seven years without any internal examination of the plates. It is not remarkable, therefore, that explosions are becoming so frequent."

LIGHT AND HEAT FROM ELECTRICITY AND THE STARS.

A very remarkable scientific lecture was lately delivered before the Royal Society in London, by Prof. Miller, its treasurer. He related the results of a large number of experiments which he had made to test the chemical effects of different rays of light upon photographic paper, when transmitted through various transparent substances. There is a wonderful difference of chemical effect produced by different lights; and as great a variety of effect obtained from transparent substances in transmitting and absorbing both light and heat. Some of the results obtained from Prof. Miller's experiments and related in his lecture we give in a condensed form.

Some bodies which are transparent to light are not equally so to radiant heat. Glass for example, arrests a large portion of the rays of heat emitted by bodies which are not sufficiently hot to become luminous; but pure rock salt, freely transmits rays of both light and heat from all sources. In light there are also chemical rays, and while common glass absorbs many of these, quartz transmits them freely. The chemical rays of various luminous objects vary greatly in quantity and quality. Some sources of light emit rays of much higher refrangibility than others. Thus the flame of ordinary coal gas, when burned in an admixture of air so as to produce a blue light and a smokeless flame, gives out scarcely any rays capable of affecting an ordinary photographic plate; whilst the same gas, burned in the ordinary manner for illumination, emits decided rays capable of producing chemical action. It is also remarkable that the rays emanating from the intensely hot jet of the oxyhydrogen flame exert scarcely any chemical action upon sensitive collodion; but when this flame is thrown upon a ball of lime, the light then emitted contains as large a proportion of chemical rays as the light of the sun, and they are of nearly the same refrangibility. The most wonderful source of chemical rays, however, is afforded by the electric light, the chemical spectrum of which is three times as long as that obtained from the sun itself. Out of fourteen transparent solid substances through which light from the electric spark was sent and permitted to fall upon collodion coated with the iodide of silver, rock crystal, ice, and fluor spar transmitted the greatest number of chemical rays; the diamond was much inferior to any of these. Out of nine transparent liquids tested in the same manner, pure water was found to be the best; out of thirteen gases, oxygen, nitrogen, hydrogen, and carbonic acid were superior to all the others. Photographs were taken by the transmission of the light through these substances, and the time required in making the pictures was carefully noted.

In the case of reflection from polished surfaces, metals were found to vary greatly in the quantity of the rays which were reflected. Gold and lead, although not the most brilliant, reflected the rays more uniformly than the bright white surfaces of silver and speculum metal. The temperature of the hottest blast furnace does not exceed 4,500° Fah; and the oxyhydrogen flame has been estimated at a temperature of 14,600°. The spectrum obtained from this light was the same as that obtained from the solar spectrum; hence Prof. Miller considers that the temperature of the sun is not higher than that of the oxyhydrogen flame, which is far below that of the electric spark. The temperature of the sun's atmosphere is therefore considered to be less than the heat of the electric spark.

With respect to the influence of light from the distant stars, Prof. Miller said: "Conjointly with Mr. Huggins, I have been pursuing investigations with an 8-inch equatorial refractor, and we have obtained some interesting results, having measured the principal lines in the stars *Sirius*, *Betelgeus* and *Aldebaran*. The light of *Sirius*, from the measurements of Sir J. Herschel and Mr. Bond, is little more than one-sixth-thousandth-millionth part of that of the sun, and although probably not less in size than sixty of our suns, is estimated at more than one hundred and thirty millions of miles distant. And yet it is influencing in a measure the chemical changes which are perpetually occurring upon the earth's surface, and by suitable means the changes may be recorded, estimated, and measured; we have registered these by the photograph from rays which emanated from *Sirius* twenty-one years ago." A photograph has also been taken by the rays of the star *Capella*, which is more than three times the distance of *Sirius* from the earth.

Revenue Tax upon the Products of Iron Foundries.

The Commissioner of Internal Revenue has made the following decisions with reference to taxes imposed upon various products of iron foundries:—

1st. All steam engines, whether marine, locomotive or stationary, are subject to a duty of three per cent *ad valorem*.

2d. Cast-iron shafting is liable, in all cases, to a specific duty of one dollar and fifty cents per tun, under the act of March 3, 1863. Wrought-iron shafting, if held to be manufactured within the meaning of Division No. 71, is liable to a tax of three per cent *ad valorem*.

3d. Railroad-car wheels are taxable, in all cases, one dollar and fifty cents per tun. All other castings of iron exceeding ten pounds in weight, not otherwise provided for, are taxable one dollar and fifty cents per tun, by act of March 31, 1863.

4th. Castings of all descriptions made exclusively for instruments, articles of machinery upon which duties are assessed and paid, are exempt from duty under Section II., act of March 3, 1863.

5th. Castings not exceeding ten pounds in weight, which are so well known and so generally used as to have a commercial value in themselves, are taxable three per cent *ad valorem*, when not otherwise provided for.

6th. Castings used for bridges, buildings or other permanent structures are taxable one dollar per tun. Permanent structures are interpreted to mean bridges, buildings, monuments and edifices of all descriptions. Lamp-posts, water and gas pipes are not held to be permanent structures; but all such castings are taxed at the rate of one dollar and fifty cents per tun.

7th. Stoves and hollow-ware are taxed at the rate of one dollar and fifty cents per tun of two thousand pounds.

8th. Casual and ordinary repairs are not taxable, but renewals of any part of an engine, as, for instance, a boiler, cylinder, piston-rod, valve motion or governor—such parts being considered manufactures in themselves—are taxable, when made to replace corresponding parts of an engine, broken or worn out, and thrown aside. The same is true of cars, and all machinery, when new parts are supplied.

An Awful Shell.

An "occasional correspondent" of the *N. Y. Tribune*, writing from Washington on the 18th of April, states that a newly-invented explosive shell that has been recently tried at Woolwich, England, can "burst a plate however thick, produce a tremendous explosion, and set the vessel on fire." He states that one weighing 286 pounds, made of iron, and loaded with 11 pounds of explosive powder, was thrown from a 300-pounder (Armstrong), with a charge of 45 pounds of powder, and with a velocity of 1,330 feet per second. This is the shell recently described in our columns (page 257), as having been fired at the target in the experiments at Shoeburyness, England. The velocity of this shell is due to the charge of powder, not to the construction and nature of the shell. Such shells can be manufactured here as well as in England, but we cannot give them a high velocity with the small charges of powder which are used in our large cast-iron guns.

The word "rhodomontade" has passed into most modern languages; it signifies a boastful way of talking, and is taken from Rodomonte, a boisterous character in "Orlando Furioso."

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DISCOVERIES AND INVENTIONS ABROAD.

Silvering Cloth.—A patent has been taken out by J. Cimeg, of London, for depositing metal upon silk or woolen fabrics by a peculiar process. He states that the concentrated juice of fruits, such as that of currants and apples, contains a small amount of a chemical principle which acts as a mordant on cloth and possesses the property of depositing metals, such as silver and gold, from their solutions. He takes a silk or woolen fabric, for example, and after cleaning it thoroughly to remove all the grease and gum from it, he immerses it in a solution of nitrate of silver, ammonia and Rochelle salt for a short period then steeps it in the juice of the fruit named. A reaction then takes place and pure silver is deposited in the pores of the fabric from the nitrate of silver solution previously taken up by the cloth. After this the fabric is washed in soft water, when the silver is found adhering to the fabric and cannot be removed by washing.

Extracting Wax from Wool.—Besides grease and fatty acid, which wool contains, there is also a peculiar waxy substance called "suint" which has hitherto never been extracted for use for manufacturing purposes. A patent has been taken out in England, by J. G. Tongue, for recovering this substance from wool when it is undergoing the operations of cleaning, by steeping it in strong alcohol, which dissolves the wax. By distillation afterwards the alcohol is separated from the wax, and recovered in a refrigerator to do duty over again, and the wax is left behind in the still.

Soap Powder.—The forms in which soap is made and prepared are of endless variety. A very peculiar condition of soap in powder for use has just been patented by J. Mackay, of Glasgow. For a large quantity the proportions are as follows :—1 tun of caustic soda in crystals, 112 pounds of the best yellow soap, 112 pounds of pearl ashes, 112 pounds of soda ash, 7 pounds of sulphate of soda, 7 pounds of the chloride of lime, 7 pounds of sulphuric acid, 20 gallons of water and 7 pounds of palm oil. These ingredients are all mixed together in a boiler and submitted to a boiling action for five hours, then poured out into shallow troughs, where it is stirred until it is completely cooled. It then forms a granular crystallized powder, in which state it is packed for sale.

A New Safety Paper.—A new invention of a safety-paper to prevent forgery or alteration of shares, bank-notes, cheques, bills or any paper demanding security, is mentioned in *Macniven and Cameron's Paper-trade Review* (English). It consists of a single sheet formed of several layers of pulp, superposed, of different nature and colors, according to requirements. The check it gives to alterations of documents is very excellent. The middle layer of the paper requires only to be colored of a delible or destructible color; the chemical acid employed in obliterating the writing will also destroy this color, and this cannot again be restored while the paper surface remains white.

A New Lamp for Mines.—At a late meeting of the Royal Society of Edinburgh, Mr. A. McIvor, of the University of that city, exhibiting a new mine lamp, the primary object of the invention being the safe illumination of coal and iron-stone mines infested with explosive gases, in which the destruction of human life and limb that now takes place is a disgrace to modern science and mechanical skill—about twenty persons, on an average, perishing weekly; or, to put this fact in another view, a life is laid down for every 75,000 tuns raised. The illuminating agent employed by the inventor is electricity, evolved from permanent magnets. The steam power on the mine bank acting through ordinary gearing connection on a magneto-electric machine there stationed, develops the fluid; and insulated conducting wires, let down the mine shaft and along the galleries to the workings, give off the lighting effect at their terminal points. The extremities of the wire-conductors are connected with a self-acting electric lamp, enclosed within a gas-tight case. This last-named part is essential to the plan, inasmuch as the electric light through such an enclosure may be given out in any atmosphere, however explosive. The case in the model shown was a strong rectangular cast-iron frame, glazed on the sides with plates of mica, which is unaffected by the intense heat given out by the electric light, and does not crack from flexure or from water dropping on it, as glass would certainly do. The expansion of the air within the case is provided for by a very simple contrivance. An india-rubber pouch or gas-bag is suspended below the lamp to receive the expended air; and this air, on the temperature within falling on the extinction of the light, rushes back into the lamp-case, and maintains the atmospheric equilibrium with the utmost delicacy, an arrangement which prevents the mica sides of the case from being injured by the inequality of the internal and external pressures. The lamp, with its apparatus, is mounted upon a carriage to run upon the rails of the mine, and by these means and concave mirrors an intense light may be brought to bear upon any required part.

Casting Tubes of Copper and Brass.—J. S. Crossland, of Ashton-under-Lyne, England, has taken out a patent for an improvement which consists in casting tubes in hot dry sand or loam cores in a vertical or inclined position, and pouring the metal into the mold from the top; chaplets or thicknesses, stops or wedges of copper or other metal, being placed between the core and the mold. The molds are made of common molding sand or loam, and baked in a stove or oven, or the molds may be made of iron or other metal, and made hot previous to casting. The cores are made of common molding sand or loam, having a perforated iron core barrel or stem upon which the sand or loam is coated and baked in the stove or oven, and put into the molds hot. When cast, the tubes are fit for use, but in some cases they may be turned in a lathe.

Inoxidable White Metal for Taps.—J. Vigoroux, of Nimes, France, has taken out a patent for making taps in the following manner :—Smelting and casting are effected in the ordinary manner, only that the tap is cast in three operations; that is the barrel or outer part of the tap, composed of 785 parts of tin, 195 parts of regulus of antimony and 20 parts of nickel; the key which is composed or cast in two parts, the first part or conical core, with its upper part, being composed of 807 parts of tin, 175 parts of regulus of antimony and 18 parts of nickel; and lastly, the second part of the key or jacket, enveloping the conical core and composed of tin, 715 parts; regulus of antimony, 215 parts; and nickel, 70 parts. These three castings being executed, the pieces are turned in the lathe, and the tap produced is, from the beauty of the metal, quite ornamental.

Artificial Light.—A patent has been taken out by M. Joseph Alphonse Mille, of Paris, for a compound to produce a light by means of a current of air forced through it. The composition consists of benzine, 80 parts; camphor in powder, 10 parts; and ether 10 parts. A current of air is driven by a small fan through this hydro-carbon liquid, and it takes up a small portion of it in a gaseous state. It is then conveyed through spongy platinum and ignited, forming a jet of gas-light. The described mixture is somewhat different from others which have been used, but the mode of charging air in this manner with hydro-carbon vapor for illumination is quite old. This method of producing vaporized gas-light has been applied to lamps by M. Mille, a small fan being placed in the pillar of a lamp and operated by clock-work.

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week. The claims may be found in the official list.

Water Wheel.—The ordinary bucket water wheels, termed over-shot and breast wheels, depend upon the gravity of the water for power—impact imparting little or no power to the wheel—and in order to obtain the greatest amount of power from gravity the buckets in over-shot wheels have been so arranged as to receive the water at the top of the wheel a little at one side of the shaft, and to hold it as long as possible or to retain it in the buckets at the side of the wheel, where it is received, at as low a point as possible. In breast wheels the buckets receive the water about on a horizontal line with their shaft, but the buckets are arranged with a view of holding the water as long as possible, or until they reach a point nearly under their shaft. Buckets, however, when constructed in the best possible manner, with a view to this end, commence to discharge their water as soon as they pass the level of their shaft and gradually lose their contents until they reach a point nearly under[illegible] their shaft. Hence, it will be seen, all the water [illegible]capes from the buckets previous to their arrival at [illegible] point underneath the shaft, is principally wasted or lost. The object of this invention is to obviate this difficulty, and to this end the buckets are perforated with holes, any suitable number, so that the several buckets of the wheel will all communicate with each other, and the water instead of escaping from the buckets or being spilled out from the same as they pass below the level of the shaft, will pass from one bucket to the other, and form a continuous sheet of water at one side of the wheel; no water being discharged from the buckets until they reach a point nearly underneath the water-wheel shaft. Jonas Holmes, of Clayville, N. Y., is the inventor of this water wheel.

India-rubber Spring.—A great difficulty has been heretofore experienced in the general application of india-rubber to the manufacture of springs which operate by tension, owing to the want of some suitable mode of constructing the ends of the springs which would provide for their convenient attachment and for wear, and render the ends of the springs as strong and durable as the other parts, The object of this invention is to remedy this defect; to this end it consists in a spring composed of a piece of india-rubber tubing with an eye, or its equivalent, of metal attached to each end by means of a shouldered shank inserted into the tubing, and a seizing or band applied around the external of the tubing between the shoulder of the shank and the eye. S. J. Seely, of Brooklyn, N. Y., is the inventor of this improvement.

Growth of Illinois.

In the year 1836—only 27 years ago—Northeastern Illinois was dependent on Ohio for her butter and flour, and even vegetables. Chicago was fed mainly from the trading schooners which ran between Lake Erie and Lake Michigan; but now that spot is the greatest granary in the world. Besides this, it is the largest beef market, the largest lumber market, and probably the largest pork market in the United States. The soil of the State is of wonderful fertility, and all the vast cereal products which so astonish the world are yielded by scarcely a tenth part of the arable land. Although the stoppage of the navigation of the Mississippi, and the drain of soldiers, temporarily affects the growth of the State, a constant increase in population is nevertheless going on. Illinois is not dependent on her fertile soil alone; for, besides her rich deposits of lead, she possesses an inexhaustible supply of coal. In railroads Illinois has over 3,000 miles, intersecting the State in all directions—north and south, east and west. Were it not for those roads the war, which closed up the Mississippi river to commerce, would have fearfully crippled our resources. By those roads immense quantities of agricultural products have been sent to market; thus the roads and canal centering in Chicago delivered, in 1861, nearly 60,000,000 bushels of grain, 675,000 hogs, and nearly 60,000 head of beef cattle. In 1862, they delivered nearly 70,000,000 bushels of grain, 900,000 to 1,000,000 hogs, and over 170.000 head of beef cattle.

The Gunboat "Lafayette."

A Western journal says :—We are permitted to make the following extract from a letter received from J. F. Vincent, dated "U. S. Steamer *Pittsburgh*, Yazoo River, March 9th" :—

"The U. S. steamer *Lafayette* is here, having, after many months of work in remodeling, been finished. She is really a formidable boat, iron-clad all over, with 2½-inch iron and 2 inches of india-rubber underneath, supported by 12 inches of solid oak, and propelled by side wheels which are protected by rubber and iron. She is 304 feet in length, 50 feet beam, and draws 8½ feet of water. Her armament consists of two 200-pound Parrott guns, two 100-pound Parrott guns, and four 9-inch Dahlgrens. Her prow I do not know the dimensions of, but its cost was something like $13,000; it is made of bell-metal and malleable enough to withstand a shot if struck, yet is hard enough for the purpose for which it was intended."

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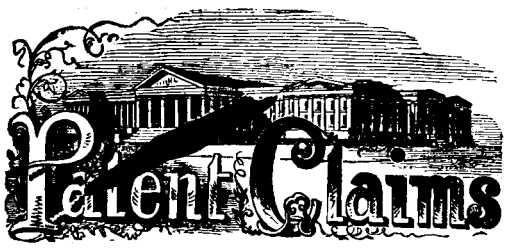

ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING APRIL 21, 1863.

Reported Officially for the Scientific American.

*** Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

38,207.—Harpoon.—Mayhew Adams, Chilmark, Mass. :

I claim the application to the harpoon of a semi-revolving head resting upon segments of screws, or angular pivots, causing the harpoon to turn infallibly at right angles with the semi-revolving head, when fast to a whale and a strain set upon it, and there to remain fixed or coupled together.

38,208.—Kerosene Lamp.—Samuel Adlam, Jr., and Jeremiah R. Fogg, Portland, Maine :

We claim the band, D, in combination with the pivoted cone-plate, I′, and cap, C, substantially in the manner and for the purpose set forth.

38,209.—Pump.—Abraham Arnold, Heidelberg, Pa. :

I claim a double-acting force pump having the connecting rod, A, of the lower sucker to work through the upper sucker at F, when operated by the double crank, represented by Fig. 2 at C C, the whole as shown and described.

38,210.—Screen for Heaters.—William C. Baker, New York City :

I claim the employment, in combination with the steam or hot-water pipes, of a screen which is constructed substantially in the manner described, for the purposes set forth.

38,211.—Steam Radiator.—William C. Baker, New York City :

I claim conveying the steam from the boiler to the coil, and the condensed steam from the coil to the boiler through one pipe, as described, by combining said pipe with both ends of the coil, substantially as hereinbefore set forth.

38,212.—Low-water Detector.—William C. Baker, New York City. Antedated March 25, 1863 :

I claim the employment, in combination with a steam boiler and open pipe, E, of a pipe or opening to the ash-pit or furnace, the whole arranged to operate substantially as and for the purposes set forth.

38,213.—Pistol Holster.—Augustus A. Bennett, of Cincinnati, Ohio :

I claim the holster, A, closed automatically by the oblique flap, B, and metallic spring, D, so as to combine security with facility of use, in the manner set forth.

38,214.—Portable Fence.—John W. Blodgett, Three Rivers, Mich. :

I claim the combination and arrangement of the lapping rails, shear braces, notched sill and pivot hinge, in the manner and for the purpose described.

Second, The arrangement of the lapping rails of the panels, pivot hinge and shear braces, in the manner and for the purpose described.

38,215.—Governor.—William F. Burden, Troy, N. Y. :

I claim, first, The employment of adjustable frictional gearing, when interposed between the crank shaft and governor spindle of an engine, essentially as and for the purposes herein set forth.

Second, The auxiliary device, so applied, in connection with a governor, that the engine can be set to run at any desired speed, and yet be controlled by the same governor, substantially as described.

38,216.—Propeller Blade.—Charles H. Burton, Cleveland, Ohio :

I claim so forming the face of the bucket that lines describing such face, as shown at a b c d, &c., incline forward of a right angle at about six degrees, as shown in Figs. 1 and 5, for the purpose of causing the displaced water to flow directly aft, substantially as and for the purpose specified.

38,217.—Manufacture of Drums, Kegs, Casks, &c.—David Cope, Liverpool, England. Patented in England Oct. 8, 1860 :

I claim the binding hoop, c, substantially formed and fitted in the manner herein described for the purpose set forth and shown in the accompanying sheet of drawings.

38,218.—Device for carrying off Water from Musical Instruments.—George F. Dallon, Flatbush, N. Y. :

I claim the application to musical instruments, such as mentioned, of any absorbing or filtering material capable of absorbing and retaining moisture over to or upon any perforation or opening in the instrument, either as hereinbefore described or in any other way, which will produce the intended effect.

38,219.—Rake for Harvesters:—Cyrus C. Dennis, Auburn, N. Y. :

I claim, first, The use of an irregular gear on the surface of a sphere or segment of a sphere for the purpose, in connection with a pinion, of getting four rake motions, as herein described and represented.

Second, I claim, in combination with the irregular gear, an irregular-shaped groove conforming thereto, as a guide for the pinion, substantially as described.

Third, I claim supporting the sphere or segment thereof, at its center, by a swiveling and hinged connection, in the manner and for the purpose substantially as set forth.

38,220.—Manufacture of Paper, &c., from the Husks of Indian Corn.—Dr. Aloyse Chevalier Auer de Welsbach, Vienna, Austria. Patented in Austria Nov. 23, 1861 :

I claim the process of obtaining and separating the textile material contained in the husks and leaves and stalks of maize or Indian corn, by exposing the same, together with a solution of lime and soda, or equivalent substances, to the action of hot or boiling water, and prepering the said textile material for use in the manner above described, or in any manner substantially the same as described.

38,221.—Platform of Weighing Frames.—Charles Downer, Philadelphia, Pa. :

I claim the platform composed of the frame, H, and tilting table, I, when constructed, arranged for suspension to the graduated beam of a weighing frame and operating substantially as and for the purpose herein set forth.

38,222.—Machine for Canceling Postage and other Stamps.—Samuel W. Francis, New York City :

I claim the method of canceling adhesive stamps by means of a cutting edge, or series of cutting edges, so operated that, when applied to the stamps, one or more portions thereof shall be cut out and removed without injury to the material to which the stamps are attached, substantially as set forth.

I also claim the combination and construction of a hand instrument for canceling stamps by cutting, as before referred to, so that by one downward pressure its cutters or scrapers shall be operated to remove a portion of the stamp without injury to the paper underneath, substantially as forth.

I also claim the combination with cutters operated by a sliding handle of a studded guard and support, so arranged that the instrument is thereby caused firmly to grasp or to impinge upon the surface of the stamp to be canceled, while the cutters are being operated, also to guard the cutters against undue pressure upon the paper, substantially as set forth.

I also claim the combination with the cutters of a hand instrument for canceling stamps by cutting out of and removing from the stamp one or more portions thereof, of a spring so arranged as to bear the cutter upon the stamps with a pressure requisite to produce an incision in the paper of a depth not exceeding the thickness of stamps, substantially as set forth.

38,223.—Coal-oil Burner.—Solomon Frederick, New York City :

I claim, as an improved article of manufacture, the top, D, when made in the peculiar form and manner herein shown and described, and applied to the tube, C, as set forth.

[This invention relates to an improvement in coal-oil burners for lanterns, whereby the flame is prevented from being extinguished by the swinging of the lantern or its sudden movement, a contingency of frequent occurrence in the use of coal-oil as a burning material for lanterns. The invention consists in the employment of a tube which is fitted over the wick-tube of the burner, and has a peculiar-shaped top applied to it—the latter being provided with holes in its bottom.]

38,224.—Attachment of the Tow-lines of Canal-boats.—Charles W. Gage, Homer, N. Y. :

I claim the lever, d, the rod, C, the block, k, and the spring, j, the whole arranged in the manner and for the purpose substantially as herein described.

38,225.—Car Coupling.—James H. Hills, Burlington, Vt. Antedated March 24, 1862 :

I claim the construction of a coupler with cavities or opening, a and b, in Fig. 2, and tumbler, c, in Figs. 1 and 3, combined with link, f, in Fig. 1, substantially in the manner and for the purpose above set forth.

38,226.—Water Wheel.—Jonas Holmes, Clayville, N. Y.:

I claim the employment or use, in an overshot breast or any bucket water wheel, of perforated bottoms, D, to the bucket, so arranged as to operate in the manner and for the purpose herein set forth.

38,227.—Apron for Stoves and Grates.—William Hughes, Rochester, N. Y. :

I claim the combination of the slides, C C, apron, A, provided respectively with the holes, c c, and openings, a a, which, when in coincidence, allow the entrance and perfect action of the poker, without the escape of dust, substantially as herein set forth.

38,228.—Mode of driving Propeller Screws.—R. C. Jackson, Cleveland, Ohio :

I claim, first, Placing the crank-shaft that connects with the engine, in line with the outboard shaft, as specified.

Second, I claim the herein-described arrangement for coupling the outboard and inboard shafts together, for the purpose set forth.

Third, I claim the arrangement of the compound gear wheels, E G and H I, and counter-shaft, F, for the objects herein specified.

38,229.—Track-clearer.—Job Johnson and Joseph Barber Bolton, Brooklyn, N. Y. :

We claim, first, A track-clearer fastened upon the end of a slide that is inclined backwards and upwards, and fitted with a spring, or its equivalent, substantially as specified, whereby the said track-clearer rides over and clears the ends of rails or other rigid parts with which it may come in contact, as set forth.

Second, We claim the stocks, e, and boxes, h, constructed as specified, in combination with the track-clearers, f, and sliding rods, g, as set forth.

Third, We claim the lever, m, in combination with the track-clearers, f, said lever being fitted and acting as and for the purposes specified.

Fourth, We claim the rod, o, and socket, p, in combination with the track-clearers, f f, for the purposes and as specified.

38,230.—Truss.—C. D. Lakey, Loudonville, Ohio :

I claim, first, The pad, A, stem, B, pipe, C, and spring, I, when arranged and combined as herein specified.

Second, I claim the catch, J, in combination with the disk, H, when constructed, arranged and operated substantially as and for the purpose set forth.

38,231.—Device to prevent counterfeiting Bank-notes, &c.—M. Carey Lea, Philadelphia, Pa. :

I claim, first, The printing or staining a ground design or incorporating a color in a graduated shade.

Second, Printing simultaneously the signatures, numbering and seals by placing the stamps, blocks, &c., in one frame.

Third, Printing the ornamental part of the note as distinguished from the ground tint in fugitive and the obligatory and denominational part in permanent color; all as already described or in any other manner substantially the same.

38,232.—Harvester.—John M. Long, Hamilton, Ohio. Antedated Dec. 4, 1862 :

I claim constructing the center plates, C and D, with a central pivotal bearing, in combination with the vibratable center bolt, E, and outer bearings, c c, substantially as described and for the purpose specified.

38,233.—Crank-wrist.—John M. Long, Hamilton, Ohio :

I claim so making the wrist that the ferrule which covers the screw bolt or pin, B, shall be let into the face of crank, A, and held in place by the screw bolt, B, substantially as and for the purpose set forth.

38,334.—Pump.—Arthur McCarter, Norristown, Pa. :

I claim, first, The combination of the three-faced valve, moved by the water, with the valve seat and the auxiliaries thereto, the whole constructed and operating substantially as and for the purpose described.

Second, The three-faced valve in combination with the five ports, substantially as described.

38,235.—Gaiter.—George W. Ludlow, Elizabeth, N. J. :

I claim the combination of the spring, B, with the back of said gaiterette, substantially as and for the purposes set forth.

38,236.—Window-sash Supporter.—John N. McLean, New Philadelphia, Ohio :

I claim the irregular groove, i, slide, j, and catch, m, in combination with the face plate, O, and its projections, n and p, operating in the manner and for the purpose set forth and described.

38,237.—Hot-air Engine.—Henry Messer, Roxbury, Mass.:

I claim the described new method of regulating a hot-air engine by means arranged and operating substantially as herein set forth.

38,238.—Steam Cooking Apparatus.—Francis Milliken, Boston, Mass. :

I claim the within-described apparatus for frying and broiling by means of steam, arranged and operating in the manner substantially as set forth.

38,239.—Culinary Steamer.—L. F. Noe, New York City :

I claim a culinary steamer combining the attachment or junction of the top and bottom portions below the line of support upon the vessel on which it is to be used, with the projecting rim, F, or its equivalent, substantially as and for the purpose set forth.

38,240.—Holder for Hat Brushes.—J. M. Osgood, Chelsea, Mass. :

I claim the combination of the band, A, and projections or holders, d g, or their equivalents, for supporting and carrying a hat brush, as described.

I also claim making the spring, D, adjustable so as to increase or diminish the distance between the holders, d g, for the purpose described.

38,241.—Portable Fence.—Joshua Reber, Shoemakerville, Pa. :

I claim the adjustable hinge wire, C, in connection with the transverse grooves and staples in the pickets, when used for the purpose as herein described and set forth.

38,242.—Clover-huller.—Christian Reif, Lewis township, Pa. Ante-dated, Jan. 30, 1863 :

I claim the adjustable cylinder, C, with its conveyer, A, adjustable wind gate, G, and inclined board, E, when arranged and combined as herein described.

38,243.—Flask for Founders.—A. L. Robinson, M. M. Donnelly and D. H. Krum, Cincinnati, Ohio. Antedated Nov. 7, 1861 :

We claim so supporting the core, C, that it may be released and allowed to fall from the interior of the casting at a suitable time after the metal has been poured, the casting meanwhile remaining supported by its rim resting upon the base, A, substantially in the manner and for the purpose set forth.

38,244.—Corn Planter.—J. B. Ryder, Wapello, Iowa :

I claim, first, The seed slide, B, constructed and operating in the manner and for the purpose set forth.

Second, The cut-off, I, constructed and operating in the manner and for the purpose set forth.

Third, The combination of the slide, B, and cut-off, I, substantially in the manner and for the purpose set forth.

Fourth, The gravitating double delivery valve, m, constructed and operating in the manner and for the purposes explained.

Fifth, The combination of the double scattering bar, with the delivery valve, m, substantially as and for the objects specified.

38,245.—Rubber Spring.—S. J. Seely, Brooklyn, N. Y. :

I claim a spring composed of a piece of india-rubber tubing having eyes, B, or their equivalents of metal, provided with shouldered shanks, a b, inserted into its ends and secured by seizing or bands, c, substantially as herein specified.

38,246.—Sewing Machine.—Chas. A. Shaw & J. R. Clark, Biddeford, Maine :

We claim, first, The combination and arrangement of the wheels, m m m′ m″, and their shafts, with the spring, 3°, and plates, 4, 5, 5′, which plates are connected at one end by a joint, or its equivalent, substantially in the manner and for the purpose set forth and specified.

Second, We claim arranging and combining the wheels, m m m′ m″, wheels, f f′, crank, g, and spring, 3°, with each other and with the plates, 4, 5, 5′, in such a manner as to be taken out of or put into the body of the machine, A, all at one time, by means of the screws, n n, or their equivalents, substantially in the manner and for the purpose set forth and specified.

38,247.—Steam Radiator.—J. J. Smith, New York City :

I claim as a new article of manufacture an ornamented coil radiator, substantially as hereinbefore set forth.

38,248.—Operating Rolls for Rolling Iron.—Wm. Stark, Pittsburgh, Pa. :

I claim the combination of the counter-shaft, gearing into the main shaft of the rolls at both ends, by means of a pair of cog wheels at one end and a pair of wheels and an idler at the other end, with the crabs, for connecting one of the rolls with the shaft at either side, at pleasure; the half crabs on the roll at either end being operated together so as to connect the roll with the shaft at one end, and disconnect it from the shaft at the other end, simultaneously, substantially in the manner and for the purposes hereinbefore described.

38,249.—Lock for Fire-arms.—A. P. Stephens, Brooklyn, N. Y. :

I claim the elliptical spring, f, attached at i, to the hammer and at e, to the lock plate, and extending as an arm, g, to the trigger, as and for the purposes specified.

I also claim the trigger, h, formed with the half and full cock notches, m and n, in combination with the arms, e e, extending from the tumbler and carrying the detent, r, for the purposes and as specified.

38,250.—Air-condensing Apparatus for forcing Liquids. Herman Strater, Jr., Roxbury, Mass. :

I claim the combination with the alternate air and water reservoir, in which the air is compressed and displaced by water, of a two-way cock so arranged in relation to a water and air supply pipe so as to operate substantially in the manner as hereinbefore set forth.

I also claim the combination with the alternate air and water reservoir in which air, at the pressure of the atmosphere, is compressed and displaced by water, of an air receiver, the two being connected by pipes and valves in such manner that the compressed air cannot return to the said reservoir, substantially as set forth.

I also claim the air and water supply pipe on the alternate air and water reservoir and pipe connecting said reservoir with the air receiver, in combination with a double cock; the arrangement being such that communication between the reservoir and the air receiver is established and stopped simultaneously with the admission to and emission from the reservoir of water, substantially as herein set forth.

I also claim the combination with the alternate air and water reservoir and air-discharge pipe connecting the same with the air receiver, of a valve or its equivalent, operated by a flat so as to automatically close the said discharge pipe and stop the supply of water, substantially as hereinbefore shown and described.

38,251.—Grain Separator.—Abner Sylvester, Dubuque, Iowa :

I claim the oval form of the riddles flattened on the middle portion, substantially in the manner and for the purpose set forth.

Second, I claim arranging said riddles in pairs, the upper ones in one pair and the lower one in another pair, so as equally to divide the quantity of matter in each pair and thus diminish greatly the momentum which the riddles tend to acquire by their movement together, substantially as and for the purpose set forth.

38,252.—Combined Plumb and Level.—F. A. Trout, New Britain, Conn.:

I claim the employment of the right-angle and circular plates, B B′, traverse bar, D, and tube, C, in combination with a spirit-level stock, substantially in the manner as and for the purpose described.

38,253.—Bag Machine.—Joseph Wells, Hoboken, N. J. :

I claim, first, The guide blocks, F G, constructed and arranged in respect to each other substantially as and for the purpose set forth.

Second, In combination with the said guide blocks, I claim the adjustable gage wheel, K, or its equivalent, as set forth, for the purpose specified.

Third, The arrangement of the lap-folders, H I, in respect to each other and in combination with the said guide blocks, substantially as and for the purpose specified.

Fourth, The changing plate, C, with its securing rod, J, or their equivalent, arranged and operating as set forth and for the purpose specified.

Fifth, The peculiar combination of the said changing plate and securing rod with the said severing knife and feeding rollers, substantially as set forth.

Sixth, The combination of the pasting plate, O, or its equivalent, with the paste slot, Z, substantially as set forth, for the purpose specified.

Seventh, The combination of the said adjustable gage wheel with the elliptical roller, R, as set forth, for the purpose specified.

38,254.—Sugar Evaporator.—C. O. West, Eliel West and John Carey, Martinsville, Ohio :

We claim, first, The two iron bars, J J, provided with depressions, j, and inclined planes at their mid lengths and ends respectively, for the purpose of allowing one or other of the pans, F F′, to rest firmly down upon the walls of the furnace when in use for boiling, and thus to receive the full intensity of the heat, or to be elevated from the walls of the furnace and away from the fire when in danger of scorching by simply shifting the pans on the track, in the manner specified.

Second, The arrangement of the deflecting plate or fender, P, depending from the furnace crown immediately in front of the "teache" opening, B, for the purpose set forth.

38,255.—Railroad Car Springs.—J. E. Wootten, Philadelphia, Pa. :

I claim the spirally-grooved orifices in the plates, A a, for securely holding the ends of the springs, when used in combination with the spiral springs of a railroad car spring.

I also claim the spring, constructed as herein described, in which the ends of the individual resilient parts thereof are permanently secured to the plates, A a, and serve the purpose of firmly holding the entire spring in one compact whole, which is equally capable of resilience under tensile, compressive, or lateral strains, without the intervention of lugs, bolts, rivets or stays, in the manner and for the purpose herein set forth.

38,256.—Ash Box for Stoves.—C. J. Woolson, Cleveland, Ohio :

I claim attaching a portable ash-box, when constructed as described, to the oven door, or side plate of a cooking stove, below the fire-door, in the manner and for the purposes substantially as set forth

38,257.—Rolling or Polishing Machine.—B. Q. Budding (assignor to B. G. Godfrey), Milford, Mass. :

I claim combining with a holding mechanism a mechanism which, while carrying a roll or rubber back and forth, at the same time per-

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mits vertical and angular movements to the roll or rubber, for the purpose of adaptation to curved or irregular surfaces or outlines.

I claim controlling the clamping or holding of the matter to be operated on through the medium of the treddle, j, and its spring, o. The ratchet, f'', pawl, m, and its spring, n, and stop, q, or their equivalents.

I claim combining with the ways, a a', over which the rubber or roll is reciprocated, the transverse or rocking levers, b', and lever, f', operating together for the purpose as above set forth.

38,258.—Grain-cleaner.—George Clark, Sandusky, Ohio, assignor to himself and Robert Dunbar, Buffalo, N.Y.:

I claim, first, The cylinders or shells, A A', arranged with a suction air space, B, between them, in combination with the adjustable valve, T, for the purposes and substantially as described.

Second, The cone distributor, C, and automatic cone apex, c', in combination with the cylinders or shells, A A', and central grain supply tube, F, for the purposes and substantially as set forth,

38,259.—Paper Card for Hooks and Eyes.—De Grasse Fowler, Jr. (assignor to himself and Merwin Fowler), Northford, Conn. :

I claim the attachment of hooks and eyes, by the means of tongues or strips partially separated and projecting from the card, substantially as hereinbefore set forth.

38,260.—Steam Plow.—A. W. Hall, St. Louis, Mo., assignor to himself and B. W. Robinson, South Reading, Mass. :

I claim the employment of a steam engine or its equivalent motive power, in combination with a series of two or more traction pulleys. f f', to be used in connection with a rope extended across and properly secured at each end of the field ; all being constructed and arranged to operate in such manner that the said motive power may be made to draw itself and the gang of plows attached across the field, substantially as herein described and represented.

38,261.—Cultivator.—Chas. W. S. Heaton (assignor to Jabez J. Piggott & Henry Reutchler), Belleville, Ill.:

I claim, first, The truss-frame, A, constructed in the manner described, in combination with short axles and vertical outside hangers, i i, as and for the purpose set forth.

Second, The guard-brace, E, arranged and operating substantially as described.

Third, The combination of the long tongues or poles, K' K', neck yoke, M, reach, L, and brace, N, substantially as and for the purposes set forth.

Fourth, The combination of the adjustable seat, O, reach, L, long tongues, K' K', neck yoke, M, and brace, N, substantially in the manner described.

Fifth, A shovel beam formed of two parts, B B', which make an angle, in combination with a slotted standard, s, which is adjustable, substantially as and for the purposes set forth.

Sixth, The combination of the jury-brace, t, which is adjustable, with the double beam, B B', and slotted standard, s, substantially as and for the purpose set forth.

Seventh, The arrangement of the foot levers, n, curved bars, p p, notched cross piece, q, roller, m, and cords or chains, o, substantially as and for the purpose set forth.

Eighth, The arrangement of the slotted adjusting pieces, c, pendent share beams, and draft device, I, with single swingle trees and frame, A, and outside hangers, i i, in the manner and for the purpose described.

Ninth, The combination of the slotted pieces, C, brace rod, E, frame, A, and pendent share-beams, substantially as and for the purpose set forth.

38,262.—Spectacles.—John Jennings. Birmingham, England, assignor to S. & J. Myers, Boston, Mass.:

I claim the spring harp-shaped bow, b, when united to the lense frames, a a, as shown to make them self-supporting, and when so united as to admit of being spread without much deviation from the center of vision, as herein represented.

38,263.—Coal Oil Lamp.—Anson Judson, Brooklyn, N. Y., assignor to himself, Lemuel Beers, Newtown, Conn., and Fred. W. Beers, Brooklyn, N. Y.:

I claim the construction of the cone of a flat-wick kerosene, petroleum, or coal oil lamp partly of transparent or translucent material and partly of metal; the two being combined together as hereinbefore set forth or in manner substantially equivalent.

38,264.—Drag Saw.—William A. Purves, Madrid, N. Y., assignor to David W. Baldwin, Watertown, N. Y.:

I claim, first, The combination of a saw frame with a transverse log-supporting frame and a mechanism for drawing up the log, so constructed and arranged in relation to the saw-driving mechanism that the latter may be caused to operate the former at pleasure, substantially as set forth.

Second, The combination of the log-supporting frame with a sliding and adjustable yoke constructed as herein described to firmly grasp logs of any dimensions and immovably to hold the same to the action of the saw substantially as set forth.

Third, The combination of the saw-driving mechanism with the yoke mounted upon the transverse log frame and an adjustable friction or other gear so constructed and arranged and operating that the said yoke may be slid along the said frame and the log drawn up to the action of the saw the requisite distances at the will of the operator substantially as set forth.

Fourth, Connecting the one end of the shaft of the adjustable friction or other gear with a spring lever pivoted to the frame, while its other end is placed in fixed bearings in the frame, substantially as set forth.

Fifth, The combination with the saw-driving mechanism of a swinging guide frame and the saw guide block, so that the saw in its reciprocating play may be properly guided, at the same time allowing it to descend during the progress of the work, substantially as set forth.

Sixth, The employment in combination with a reciprocating saw-blade of converging side braces, whereby the flexible saw is during part of its operation laterally stiffened, substantially as set forth.

38,265.—Loom.—O. C. Smith, Salem, Mass., assignor to A. N. Clark, Boston, Mass.:

I claim, first, The swinging frame, j, arranged and operating substantially as herein-above described, and for the purpose of taking up the slack in the warp threads.

Second, The elastic and non-elastic nipping and feeding rollers operating together and upon the elastic threads passing between them, substantially as herein-above described.

Third, The peculiar arrangement of devices herein described for operating the shuttles of the loom, the same consisting of the rack-bars, u u', pinions, t t, &c., and vertical lever, b', connected with and receiving motion from the driving shaft of the loom, substantially as set forth.

38,266.—Mounting and operating Ordnance.—John Taggart, Roxbury, Mass., assignor to himself & Liveras Hull, Charlestown, Mass.:

I claim either one or two cannons and a rotary chassis or slide frame, arranged and combined in manner and so as to operate together substantially as specified.

I also claim a pivot carriage or traversing platform, one or two cannons, and a rotary chassis or frame combined and arranged in manner and so as to operate substantially as above specified.

38,267.—Liquid Composition for bating Skins and Hides.—Rudolph Wager (assignor to himself & Gustavus Groezinger), Lancaster, Pa.:

I claim the materials added to water, in the formation of the bate, in the manner substantially as set forth in the process of treating skins or hides for the purpose specified.

38,268.—Water Elevator.—Samuel S. Williams (assignor to Henry J. Bailey), Pittsburgh, Pa.:

I claim the partial covering to the top of a tilting well-bucket with an opening on each side of the bale, substantially as described.

Also the yielding trip for tilting the buckets, constructed and arranged substantially as described, that is to say, having its center of motion below the point at which it first comes in contact with the top of the buckets and hence descending in the line of an arc of a circle as it is carried over the trough.

Also, in combination with the yielding trip, the hooks or other equivalent device to engage the trip, when placed back of the mouth or opening in the buckets for the discharge of the water, so that the water, as it is discharged from the bucket, shall not run over the hook and trip, substantially as described.

38,269.—Self-balancing and Self-closing Faucets.—Enoch Osgood, Boston, Mass.:

I claim, first, A valve and a diaphragm connected together and arranged as herein described to hold and resist any pressure of fluids that may come between them to pass out through the valve for use, the diaphragm to be any degree larger than the valve requisite to give it any closing power wanted, the valve closing against the current of water, when relieved of the action of the lever, K, or its equivalent.

Second, In combination with the foregoing, an adjustable graduating pressure, attached to resist the closing of the valve as desired for water closets, and other purposes, substantially as and for the purpose herein described.

38,270.—Filter.—J. A. Thompson, Geneva, N. Y. Antedated Nov. 29, 1861:

I claim a filter and cooler for water and other liquids constructed and arranged and operated substantially as described.

RE-ISSUES.

1,455.—Packing Cartridges.—Christian Sharps, Philadelphia, Pa. Patented July 10, 1860:

I claim packing the detonate in the collar of metallic cartridge cases by means of a wad, d, which serves the two-fold purpose of retaining the detonate within the collar and of a rigid medium for resisting the blow of the hammer.

1,456.—Setting Teeth in Saws and Saw Plates.—N. W. Spaulding, San Francisco (formerly of Sacramento), Cal. Patented Sept. 10, 1861:

I claim, first, Forming the recesses or sockets in saws or saw plates, for detachable or removable teeth, on circular lines, substantially as and for the purpose herein set forth.

Second, In combination with sockets or recesses formed in saws or saw-plates, as herein recited, I claim teeth having their base or bottom parts formed on circular lines as described.

1,457.—Shingle Machine.—Oren Stoddard, Busti, N. Y. Patented Dec. 20, 1859:

I claim, first, The relative arrangement of the knife frame, E, and connecting rod, D, by which the pull of the latter is made to act lengthwise of the former as herein-before described.

Second, The combination of the jointing planes, q, with the fly-wheel, F, connecting rod, D, and knife, F, as described when all the parts are arranged in relation to each other as set forth.

Third, The combination of the fluted rollers, H H', provided with ratchet wheels and operated by pawls as represented with the cutting knife, F, as set forth.

Fourth, The combination with the cutting knife, F, of the adjustable guides, G G, by which the cut of the knife can be varied as herein set forth

1,458.—Machine for making Horse-shoes.—Thomas R. Taylor, Brooklyn, N. Y. (formerly of Cleveland, Ohio.) Patented April 30, 1860:

I claim, first, Cutting off from a heated bar of iron, a blank piece, then bending, swaging, pressing, and creasing the same, thus forming a shoe by the conjoint and continuous operation of the described mandrel head, N, jaws, R R, and female dies, p p, and male die, O, substantially as herein set forth.

Second, I claim the reciprocating male die, O, and mandrel head, N, conjointly with the female dies, p p, contained within mutually reciprocating jaws, R R, arranged and operating as and for the purpose specified.

Third, I claim the recessed reciprocating and vertically swinging jaws, R R, together with the closing of the same, by their descent into an opening in the bed-plate as and for the purpose described.

Fourth, I claim the projectors, 1010, on the mandrel head, N, and the recesses, 11 11, on the male die, O, for forming the heel caulk of the shoe, in the manner specified.

Fifth, I claim the recesses, r r, in the female dies and the recess, f, in the male die, for forming the toe caulk as set forth.

Sixth, I claim operating the cutter, U, by the movement of the mandrel, K, lever, V, slider, U', and rod, v', as and for the purpose specified.

1,459.—Guard Finger for Harvesters.—Walter A. Wood, Hoosick Falls, N. Y. Patented July 1, 1856:

I claim the particular form and construction of the finger or guard as herein represented, viz: with the forked cap, E, recess or depression, A, raised edges, a a, and neck, c, behind them, by means of which the cutting is facilitated in the manner set forth.

1,460.—Guard Finger for Harvesters.—Walter A. Wood, Hoosick Falls, N. Y. Patented July 1, 1856:

I claim first, A finger or guard recessed or dropped-off so as to be fastened to the under side of the finger-beam which has a bevel or inclined form, or is similarly dropped-off while its shear or cutting edge is raised up near the top of said bar, or to a line passing over the bar, for the purpose of allowing the cut grass to readily pass over the finger bar, substantially as described.

Second, I also claim as a means of making the elevation of the shear edge above the base or heel of the finger or guard, and of affording a bearing for the finger bar and for the sickle or cutters, the four planes, 1, 2 3 4 substantially as described and represented.

DESIGNS.

1,747.—Medallion Pen.—Albert Granger, New York City. Antedated April 15, 1863.

1,748.—Goblet.—Frederick McKee, Pittsburgh, Pa.

Magazines and other Publications Received.

THE ATLANTIC MONTHLY. Published by Ticknor & Fields, Boston, Mass.

Cultivated readers of periodical literature look as eagerly for the appearance of this magazine as for the daily paper, for both are, in their way, a necessity. The leading article, "Charles Lamb's Uncollected Writings," is a genial account of some of the hitherto unpublished writings of "Elia" which will be appreciated by his admirers. "Dark Ways," by Miss Prescott, is full of the impetuosity and *élan* which marks the style of this lady; and "Gala Days," by Gail Hamilton, "Shall we Compromise," by D. A. Wasson, "Up the Thames," by Hawthorne, "The Human Wheel—its Spokes and Felloes," by Dr. Holmes, "The Carboniferous Period," by Agassiz, besides poems of the usual excellence, comprise the principal articles for the May number. Dr. Holmes poaches a little on our manor when he explores the workshops of the country, but he does it in such a thorough manner that we accept him as a valuable coadjutor. Gail Hamilton's "Gala Days" is (we confess to our bad taste) abominably written. If a writer has any particular phase of society, any question of ethics, esthetics or popular science which he or she wishes to ventilate, why not mount some easy-ambling, soft-pacing Pegasus, instead a hard, fierce, raw-boned jockey of a steed that goes pounding and hammering along the literary highway, shocking every sensibility and sentiment in the nervous reader. "Gala Days" is hard and angular, as full of facets, but not quite as brilliant, as a brilliant-cut diamond, and we read it with pain and digested it with difficulty. Oh, Gail! when you have such sensible views of things in general, why will you thus roughly throw them at people?

SORGO; OR, THE NORTHERN SUGAR PLANT. By Isaac A. Hedges. Published by Applegate & Co., Cincinnati, Ohio.

This is a small volume containing a history of the introduction of the Chinese sugar cane, the imphee, &c., into our country, with instructions respecting the selection of seed, planting, cultivation, cutting, the arrangement of sugar-works and the manufacture of sirup and sugar. It is a very opportune and practical illustrated treatise upon a most important subject to our Western people.

ANNETTE; OR, THE LADY OF THE PEARLS. By Alexander Dumas, the younger. Translated from the French by Mrs. Wm. R. A. Johnson, of Philadelphia.

This work is published and for sale by T. B. Peterson & Brothers, No. 306 Chestnut street, Philadelphia, Pa.

IMPORTANT TO INVENTORS.

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The service we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a patent, &c., made up and mailed to the inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh streets, Washington, by experienced and competent persons. Many thousands such examinations have been made through this office. Address MUNN & CO., No. 37 Park Row, New York.

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Every applicant for a patent must furnish a model of his invention if susceptible of one; or, if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them and sent, with the Government fees, by express. The express charge should be pre-paid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by draft on New York, payable to the order of MUNN & CO. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank-bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park Row, New York.

The revised Patent Laws, enacted by Congress on the 2d of March, 1861, are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The duration of patents granted under the new act is prolonged to SEVENTEEN years, and the Government fee required on filing an application for a patent is *reduced* from $30 down to $15. Other changes in the fees are also made as follows —

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design, three and a half years	$10
On filing application for Design, seven years	$15
On filing application for design, fourteen years	$30

The law abolishes discrimination in fees required of foreigners, excepting natives of such countries as discriminate against citizens of the United States—thus allowing Austrian, French, Belgian, English, Russian, Spanish and all other foreigners except the Canadians, to enjoy all the privileges of our patent system (but in cases of designs) on the above terms. Foreigners cannot secure their inventions by filing a caveat; to citizens only is this privilege accorded.

During the last seventeen years, the business of procuring Patents for new inventions in the United States and all foreign countries has been conducted by Messrs. MUNN & CO., in connection with the publication of the SCIENTIFIC AMERICAN; and as an evidence of the confidence reposed in our Agency by the inventors throughout the country, we would state that we have acted as agents for at least TWENTY THOUSAND inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of inventors and patentees at home and abroad. Thousands of inventors for whom we have taken out patents have addressed to us most flattering testimonials for the services we have rendered them, and the wealth which has inured to the inventors whose patents were secured through this office, and afterward illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! We would state that we never had a more efficient corps of Draughtsmen and Specification Writers than are employed at present in our extensive offices, and we are prepared to attend to patent business of all kinds in the quickest time and on the most liberal terms.

CAVEATS.

Persons desiring to file a caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. The Government fee for a caveat, under the new law, is $10. A pamphlet of advice regarding applications for patents and caveats, printed in English and German, is furnished gratis on application by mail. Address MUNN & CO., No. 37 Park Row, New York.

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Assignments of patents, and agreements between patentees and manufacturers are carefully prepared and placed on the records at

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the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park Row New York.

It would require many columns to detail all the ways in which inventors or patentees may be served at our offices. We cordially invite all who have anything to do with Patent property or inventions to call at our extensive offices, No. 37 Park Row, New York, where any questions regarding the rights of patentees will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid), should be addressed to MUNN & CO., No. 37 Park Row New York.

REJECTED APPLICATIONS.

We are prepared to undertake the investigation and prosecution of rejected cases on reasonable terms. The close proximity of our Washington Agency to the Patent Office affords us rare opportunities for the examination and comparison of references, models, drawings documents, &c. Our success in the prosecution of rejected cases has been very great. The principal portion of our charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted are invited to correspond with us on the subject, giving a brief story of the case, inclosing the official letters, &c.

FOREIGN PATENTS.

We are very extensively engaged in the preparation and securing of patents in the various European countries. For the transaction of this business we have offices at Nos. 66 Chancery lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. We think we can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through the Scientific American Patent Agency, No. 37 Park Row, New York.

Inventors will do well to bear in mind that the English law does not limit the issue of patents to inventors. Any one can take out a patent there.

Circulars of information concerning the proper course to be pursued in obtaining patents in foreign countries through our Agency, the requirements of different Government Patent Offices, &c., may be had gratis upon application at our principal office, No. 37 Park Row, New York, or any of our branch offices.

Notes and Queries

T. R. V., of Conn.—The use of bismuth in an alloy is to make it melt at a very low temperature.

"Old Subscriber."—You are right in one of your surmises about lightning rods. Paint is a non-conductor, but does not detract from the value of the rod as a protection. All non-conductors of electricity are insulators and confine the fluid in its passage to the earth to the rod itself. The lightning will not leave the rod and enter the building. The rod is painted to preserve it from oxidizing. Rust is a non-conductor also, but it wastes the iron, and is, therefore undesirable. If the conductor is of sufficient size and as direct as possible in its passage your building is safe enough. The paint will not injure it.

F. R., of Mass.—Your letter must have been missent, as we have not received it. We are obliged to you for your gratuitous advice as to the best manner of conducting our business. Gutta-percha cement is made by dissolving that substance in turpentine or naphtha. We cannot inform you how pipe stems are made from it.

J. F., of N. Y.—You had better call at our office and show us a sample of your proposed method of using rubber for protecting walls of rooms. We cannot understand its peculiarity from the statement you have made respecting it.

B. W. K., of Wis.—The hollow wrought-iron cylinders, 6 feet long, 36 inches bore, with sides 8 inches thick, can be made at our iron-works. They can also be fitted with threads internally of any desired pitch, but unless you have a gold mine in your own right, you had better defer the construction of one at present, as it would involve the production of special machinery to make such a cylinder, at a vast outlay. We are obliged for your compliments respecting the SCIENTIFIC AMERICAN.

W. S. D., of Pa.—There is no sense in your question as you state it. "If the piston of a steam engine of 60 horse-power, traveling at the rate of 3 feet per second, with a weight of two tuns attached to the piston, what would be the weight of the blow it would strike?" As you left out all the essential points—the distance passed over before the blow is struck, whether vertical or horizontal and the pressure of steam—"60 horse-power" conveys no meaning whatever.

J. W. P., of Maine.—Address Reynolds, Pratt & Devoe, 106 Fulton street, New York, for the kind of varnish you require for tool handles.

J. D., Jr., of Del.—Blanchard's eccentric lathe for turning irregular forms is capable of turning an ox-yoke from a pattern, but we cannot refer you to any one who manufactures them for sale.

A. M., of Ohio.—The packages of earth which you have sent us appears to be mostly silicious sand mixed with a little lime colored with iron. It is impossible to tell you its exact composition without analyzing it.

J. G. P., of Pa.—You state that the spindle of your 3-foot saw becomes heated, and that you have not been able to remedy the evil by any lubricator which you have tried. Perhaps it is a little out of line, but as you run it at the rate of 850 revolutions per minute, this great speed may be the cause. A high circumferential velocity in a saw generates a great amount of friction in the journal-boxes.

N. C. D., of D. C.—We are obliged for your continued attention to us. We receive many suggestions every week from disinterested persons which we are unable to give attention to. You and others interested are referred to Bernoulli's essay on the spinning of tops, for all phenomena connected with the matter. The subject is quite ancient, as the book referred to is itself at least a century and a half old. In Dr. Thompson's "History of Science" you will doubtless find a condensation of the subject.

J. M. Jr., of Ill.—We think there is no air in the feed water of marine engines which use surface condensers. You state that no locomotive has ever exploded while running. This is not so—several have exploded. In February, 1849, the boiler of a locomotive exploded on the Boston and Providence Railroad, while running with its train; and two explosions of locomotive boilers have occurred on the New York Central Railroad under similar circumstances.

Money Received

At the Scientific American Office, on account of Patent Office business, from Wednesday, April 22, to Wednesday, April 29, 1863:—

W. L. F., of N.J., $31; T. J. P., of Ill., $50; W. J. S., of N.J., $45; J. C., of Mich., $20; J. P., of N. Y., $16; B. W. S., of Mass, $20; P. M. R., of Cal., $12; J. W. G., of Mass., $22; R. P. P., of N. Y., $41; W. F., of Mo., $15; R. T. H., of Ill., $25; C. M. J., of Ill., $15; McD. & R., of N. Y., $16; J. D., of Ill., $10; L. & H., of Pa., $25; D. C. W., of Ill., $26; J. H., of Iowa, $25; S. R. J., of Conn., $15; W. J., of N. H., $15; G. T. L., of Pa., $20; N. S., of Mich., $20; N. & D., of N. Y., $16; W. C. O., of N. Y., $20; T. S. D., of N. J., $15; H. & B., of Conn., $20; E. D., of Mich., $45; C. F. H., of N. Y., $10; T. B. V., of N. Y., $20; J. C., of U. S. A., $16; J. M., of Mass., $25; J. W. P., of Minn., $30; C. H. M., of N. Y., $450; J. D., of N. J., $33; L. D. G., of N. Y., $16; W. D., of Ohio, $25; J. V. D., of N. J., $20; E. H. J., of Ill., $15; A. C. T., of N. Y., $16; H. B. M., of N. Y., $25; G. E. S., of Iowa, $25; F. A. De M., of N.Y., $16; M. H., of N.T., $15; S. & P., of N. Y., $20; A. A., of N. Y., $16; A. B., of N. Y., $40; F R. B., of Ill., $20; S. T., of Mass., $25; J. H. H., of N.Y., $32; L. B., of N.Y., $15; F. M. R., of Pa., $30; J. S., of Mich., $25; S. L. F., of Mich., $31; J. C. W., of N. Y., $15; S. F. G., of N.Y., $16; A. M. B., of Mich., $26; J. B. E., & Co., of Iowa, $25; J. A. A., of Conn., $16; S. S., of Pa., $26; A. J. H., of Pa., $15; C. C., of Cal., $15; A. H., of Ohio, $15; J. E. D., of Mass., $26; T. W., of Ill., $30; B. & B., of N. Y., $56; J. H., of Ill., $20; H. & D., of N. Y., $20; E. F. C., of Kansas, $16; J. S. K., of Ill., $30; P. L., of Cal., $15; A. & F., of Wis., $16; J. C., of Mass., $25; N. D. L., of Ill., $30; D. C. G., of Pa., $20; W. G. P., of Del., $23; L. B., of N. Y., $25; W. S, of Pa., $31; B. & B., of Mo., $15; T. S., of Ill., $15; W. W., of N. H., $15; L. & B., of Ohio, $16; J. N. P., of N. Y., $16; E. K. B., of Conn., $20; H. W., of N. J., $41; E. M., of N. Y., $20; S. D. B., of Pa., $30.

Persons having remitted money to this office will please to examine the above list to see that their initials appear in it, and if they have not received an acknowledgment by mail, and their initials are not to be found in this list, they will please notify us immediately, and inform us the amount, and how it was sent, whether by mail or express.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office from Wednesday, April 22, to Wednesday, April 29, 1863:—

W. L. F., of N. J.; C. M. J., of Ill.; R. S. H., of Ill.; J. W. P., of Mich.; D. C. W., of Ill.; M. H., of N. T.; J. M., of Mass.; S. L., of Mass.; A. M. B., of Mich.; W. D., of Ohio; Y. & T., of N. Y.; J. D., of N. J.; J. S., of Mich.; L. & H., of Pa.; J. V. D., of N. J.; H. W., of N. J.; W. G. P., of Del.; N. D. L., of Ill.; J. B. E., & Co., of Iowa; S. S., of Pa.; H. D. L., of Mass.; B. & B., of N. Y.; J. C., of Mass.; R. H., of N. Y.; C. F. T., of N. Y.; L. B., of N. Y.; T. W., of Ill.; J. H., of Iowa; J. E. D., of Mass.

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RECEIPTS.—When money is paid at the office for subscriptions, a receipt for it will always be given; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona fide* acknowledgment of our reception of their funds.

INVARIABLE RULE.—It is an established rule of this office to stop sending the paper when the time for which it was pre-paid has expired.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known and inclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York

NEW PAMPHLETS IN GERMAN.—We have just issued a revised edition of our pamphlet of *Instructions to Inventors*, containing a digest of the fees required under the new Patent Law, &c., printed in the German language, which persons can have gratis upon application at this office. Address MUNN & CO.,
No. 37 Park-row, New York.

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BUREAU OF ORDNANCE.

NAVY DEPARTMENT,
Washington City, April 1, 1863.

This Bureau is desirous of ascertaining whether rifled cannon can be made of wrought iron of sufficient and uniform endurance and economy to warrant their being preferred to guns of cast iron only, or of cast iron strengthened with wrought iron.

Proposals will therefore be received from any manufacturers of forged iron, to furnish a finished gun, or a block of metal from which the same may be finished.

The said gun, when finished, to weigh about 10,000 pounds, to be made into a gun throwing a projectile of 100 pounds, as used in cast iron rifled cannon of like weight, to be fired 1,000 times with service charges of the same weight and kind of powder as used in the Parrott 100-pounder, viz: 10 pounds of No. 7, without bursting or wearing in such a manner as to cause apprehensions of bursting.

The quality of metal, price, and other terms, are to be stated clearly in the proposals forwarded.

The Bureau reserves the right to itself of accepting or rejecting any of the proposals.

The time for receiving the proposals is limited to sixty days from date; and proposals will only be received from persons actually engaged in the fabrication of wrought iron.

JOHN A. DAHLGREN, Chief of Bureau.
15 8

PROPOSALS FOR RIFLE CANNON.

ORDNANCE OFFICE, WAR DEPARTMENT,
WASHINGTON, April 16, 1863.

PROPOSALS will be received at this office until 4 o'clock P. M., on the 2d day of MAY next, for the manufacture and delivery of thirty CAST-IRON SIEGE RIFLE CANNON of the caliber of four and a half inches. These cannon weigh, when finished, about 3 570 pounds. They are to be made in strict conformity to the drawing which will be furnished, and which may be seen at any United States Arsenal. They are to be cast hollow and cooled from the interior. They are to be subject to the regular United States inspection and proof, and none are to be received or paid for, but such as are accepted by the Inspector, whose decision as to the reception or rejection of any of them is to be final and conclusive.

Bidders will state the time they propose to deliver the first cannon, and the number they will deliver, weekly, thereafter. They will also state where they propose to manufacture them, and the price, per pound, for the finished cannon, delivered at the place of shipment nearest to the foundry where cast.

No bid will be entertained except from regular founders, evidence of which, and of their ability to fulfill a contract, if awarded to them, must accompany the bids, unless the bidder is known to this office.

Any bidder obtaining a contract will be required to enter into bonds with no less than two sureties, in the penal sum of $5,000 for the faithful fulfillment of his contract in all respects.

The right is reserved to reject any or all bids if the prices are deemed too high, or if, for any cause, it is not thought for the public interest to accept them. Proposals will be sealed and addressed to "Brig.-Gen. J. W. Ripley, Chief of Ordnance, Washington, D. C.," and will be indorsed "Proposals for 4½-inch Rifle Cannon."

JAMES W. RIPLEY,
18 2 Brig.-Gen. and Chief of Ordnance.

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This hammer is adapted to both heavy and light forgings; the force of the blow being entirely at the will of the operator, and for all forgings under six inches, both round or square, is the best hammer now in use, and requires but one-half the power used by every other hammer to do the same work. For an engraving and description of this hammer see page 1, Vol. V. (new series) of the SCIENTIFIC AMERICAN; some valuable improvements have, however, been since made. All communications should be addressed to H. M. AMES, Box 422, New York, or Ames Iron Works, Oswego, N. Y.

These hammers may be seen in operation at the Allaire, Neptune, Secor, Delamater, Fletcher & Harrison, Duncan & Crampton, Anderson & McLaren, Duhurst & Emerson, Charles T. Porter, Hudson River Railroad Car Shop, all in New York city; Joseph Colwell, Jersey City; Wm. White, Newark, N. J.; Providence (R. I.) Tool Co.; Whiting & Wilcox, Kaighn's Point, Phila.; Mallory & Cottrell, Mystic, Conn.; J. Dillon, Rondout; James Horner & Co., Sing Sing; Henry Esler & Co., Brooklyn; James B. Eads, St. Louis, Mo.; Franklin Iron Works, Central Railroad Shop, Albany; Burlington, Quincy & Chicago Railroad Shop, Ames Iron Works, Oswego; C. P. & A. Railroad Shop, Cleveland, Ohio. 1*

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Among the contents are :—*Linear Drawings, Definitions and Problems:* Plate I.; Applications, Designs for Inlaid Pavements, Ceilings and Balconies: Plate II.; Sweeps, Sections and Mouldings; Plate III.; Elementary Gothic Forms and Rosettes; Plate IV.; Ovals, Ellipses, Parabolas and Volutes; Plate V.; Rules and Practical Data; *Study of Projections:* Elementary Principles: Plate VI. Of Prisms and other Solids; Plate VII.; Rules and Practical Data; *On Coloring Sections with Applications*—Conventional colors, Composition or mixture of Colors: Plate X.; *Continuation of the Study of Projections*—Use of sections—details of machinery: Plate XI., Simple applications—spindles shafts, couplings, wooden patterns: Plate XII, Method of constructing a wooden model or pattern of a coupling, Elementary applications—rails and chairs for railways: Plate XIII.; *Rules and Practical Data:* Strength of material, Resistance to compression or crushing force; Tensional resistance, Resistance to flexure, Resistance to torsion, Friction of surfaces in contact.

THE INTERSECTION AND DEVELOPMENT OF SURFACES, WITH APPLICATIONS —*The Intersections of Cylinders and Cones:* Plate XIV.—*The Delineation and Development of Helices, Screws and Serpentines:* Plate XV., Application of the helix—the construction of a staircase: Plate XVI., The intersection of surfaces—applications to stop-cocks: Plate XVII.; *Rules and Practical Data,* Steam, Unity of heat, Heating surface, Calculation of the dimensions of boilers, Dimensions of firegrates, Chimneys, Safety-valves.

THE STUDY AND CONSTRUCTION OF TOOTHED GEAR—Involute, cycloid and epicycloid: Plates XVIII and XIX., Involute: Fig. 1, Plate XVIII., Cycloid: Fig 2, Plate XVIII. External epicycloid, described by a circle rolling about a fixed circle inside it: Fig. 3, Plate XIX. Internal epicycloid: Fig. 2, Plate XIX. Delineation of a rack and pinion in gear: Fig. 4, Plate XVIII. Gearing of a worm with a worm-wheel: Figs 5 and 6, Plate XVIII.; *Cylindrical or Spur Gearing:* Plate XIX. Practical delineation of a couple of spur-wheels: Plate XX.; *The Delineation and Construction of Wooden Patterns for Toothed Wheels:* Plate XXI.; *Rules and Practical Data:* Toothed gearing, Angular and circumferential velocity of wheels, Dimensions of gearing, Thickness of the teeth, Pitch of the teeth, Dimensions of the web, Number and dimensions of the arms, Wooden patterns.

CONTINUATION OF THE STUDY OF TOOTHED GEAR—Design for a pair of bevel-wheels in gear: Plate XXII. Construction of wooden patterns for a pair of bevel-wheels: Plate XXIII.; *Involute and Helical Teeth:* Plate XXIV —*Contrivances for obtaining Differential Movements,* The delineation of eccentrics and cams: Plate XXV.; *Rules and Practical Data:* Mechanical work of effect, The simple machines, Center of gravity, On estimating the power of prime movers, Calculation for the brake, The fall of bodies, Momentum, Central forces.

ELEMENTARY PRINCIPLES OF SHADOWS—*Shadows of Prisms, Pyramids and Cylinders:* Plate XXVI.; *Principles of Shading:* Plate XXVII.; *Continuation of the Study of Shadows:* Plate XXVIII. *Tuscan Order:* Plate XXIX.; *Rules and Practical Data:* Pumps, Hydrostatic principles, Forcing pumps; Lifting and forcing pumps, The hydrostatic press, Hydrostatical calculations and data—discharge of water through different orifices, Gaging of a water-course of uniform section and fall, Velocity of the bottom of water-courses, Calculation of the discharge of water through rectangular orifices of narrow edges, Calculation of the discharge of water through overshot outlets, To determine the width of an overshot outlet, To determine the depth of the outlet, Outlet with a spout or duct.

APPLICATION OF SHADOWS TO TOOTHED GEAR: Plate XXX.—*Application of Shadows to Screws:* Plate XXXI.; *Application of Shadows to a Boiler and its Furnace:* Plate XXXII.; *Shading in Black—Shading in Colors:* Plate XXXIII.

THE CUTTING AND SHAPING OF MASONRY: Plate XXXIV.—*Rules and Practical Data,* Hydraulic motors, Undershot water wheels, with plane floats and a circular channel, Width, Diameter, Velocity, Number and capacity of the buckets, Useful effect of the water wheel, Overshot water wheels, Water wheels with radial floats, Water wheel with curved buckets, Turbines. *Remarks on Machine Tools.*

THE STUDY OF MACHINERY AND SKETCHING.—Various applications and combinations: *The Sketching of Machinery:* Plate XXXV. and XXXVI.; *Drilling Machine; Motive Machines;* Water wheels, Construction and setting-up of water wheels, Delineation of water wheels, Design for a water wheel, Sketch of a water wheel; *Overshot Water Wheels; Water Pumps:* Plate XXXVII.; *Steam Motors;* High-pressure expansive steam engine: Plates XXXVIII, XXXIX. and XL; *Details of Construction; Movements of the Distribution and Expansion Valves; Rules and Practical Data,* Steam engines: low-presssure condensing engines without expansion valve, Diameter of piston, Velocities, Steam pipes and passages, Air-pump and condenser, Cold-water and feed-pumps, High-pressure expansive engines, Medium pressure condensing and expansive steam engine, Conical pendulum or centrifugal governor.

OBLIQUE PROJECTIONS.—Application of rules to the delineation of an oscillating cylinder: Plate XLI.

PARALLEL PERSPECTIVE.—Principles and applications: Plate XLII.

TRUE PERSPECTIVE.—Elementary principles: Plate XLIII., Applications—flour mill driven by belts: Plate XLIV. and XLV., Description of the mill, Representation of the mill in perspective, Notes of recent improvements in flour mills, Schiele's mill, Mullin's "ring millstone," Barnett's millstone, Hastie's arrangement for driving mills, Currie's improvements in millstones; *Rules and Practical Data,* Work performed by various machines, Flour mills, Saw mills, Veneer-sawing machines, Circular saws.

EXAMPLES OF FINISHED DRAWINGS OF MACHINERY.—Plate A, balance water-meter; Plate B, engineer's shaping machine: Plate C D E, express locomotive engine; Plate F. wood planing machine; Plate G, washing machine for piece goods; Plate H, power loom; Plate I, duplex steam boiler; Plate J, direct-acting marine engines.

DRAWING INSTRUMENTS.

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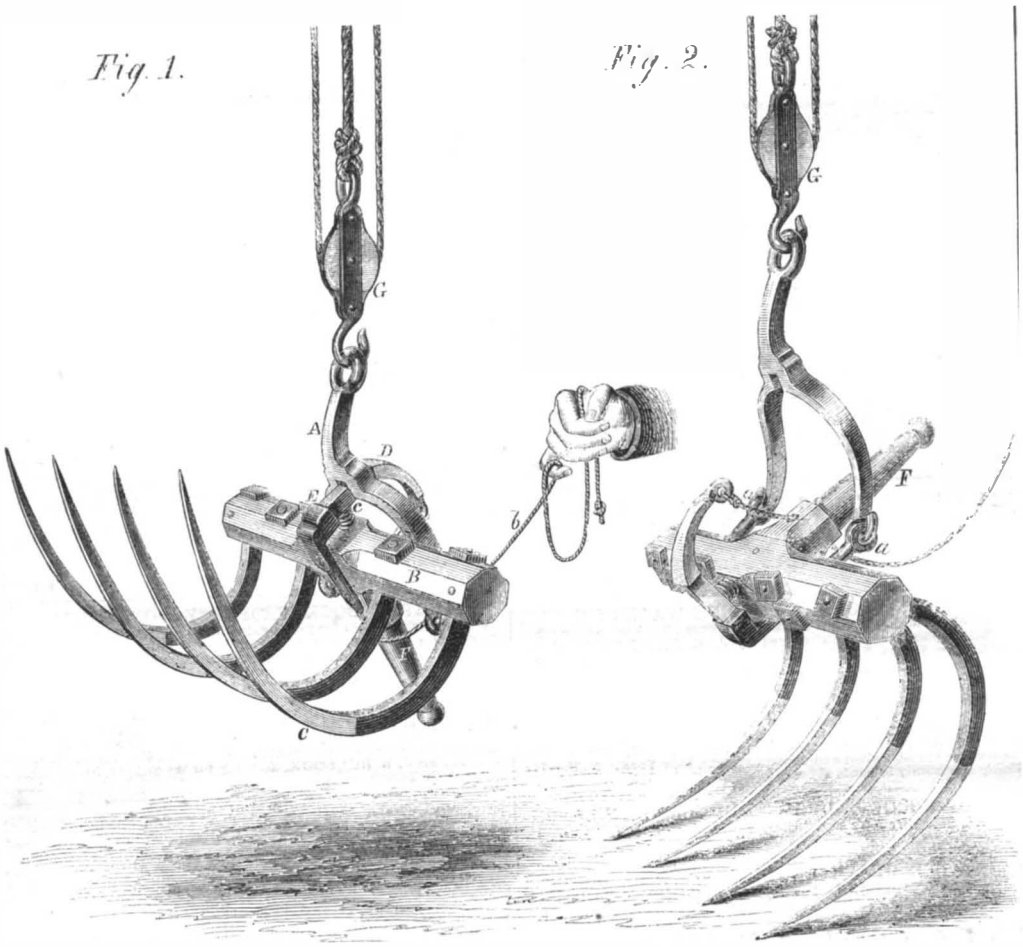
As the hot and toilsome haying season approaches, the muscles and physical energies of the farmer will be taxed to their utmost. Hurrying off at the early dawn of the day and working till late at night, he feels severely all the discomforts and inconveniences attending this onerous portion of his duties. A great part of his labor has been lightened by our ingenious inventors, who, knowing the practical wants of special departments, hasten to relieve them by substituting machines for human strength ; and it is a source of the greatest wonder to us how any man can consent to wear himself out, physically and mentally, when he can very much facilitate his operations by using the improved tools that are made and sold all over the country. Herewith we illustrate an improved hay-fork, which we will proceed to describe. Fig. 1, is a view of the fork in gear, and is supposed to be loaded with hay. The shank, A, is connected to the wooden bar, B, by the eye bolts, *a*, and has the tines, C, secured in it by nuts on each end of them. The catch, D, is jointed to the jaw, E, at one end, and has an eye at the other extremity to which the detaching cord, *b*, is fastened, a small spiral spring is shown at *c*, which keeps the catch up against the shank, A. The wooden handle, F, is grasped by the farmer when the fork is to be loaded. The block and fall, G, connected with the upper end of the shank is fastened to any point over head in the barn, or to a temporary upright in the field.



RUNDELL'S HAY-ELEVATING FORK.

The operation of the machine is as follows :—When the fork is loaded it is perfectly balanced by the position of the shank and the crook of the same. The hoisting power is then applied and the load elevated to the desired point; when this is achieved, the farmer pulls the disengaging cord, the catch is detached, and the fork swings on the eyebolts, and lets the load slide off. The position of the fork and the parts thereof is shown in Fig. 2. The apparatus can then be insinuated under another mass of hay, the shank lowered down by the fall so that the catch hooks over it, and the process repeated at will. The disengaging apparatus is quite secure, and has a square hold on the shank when hoisting, yet it works so easily that the operator, be he who he may, is able to disconnect it with one pull of the little finger. A child might work this part of the fork. The apparatus is simple and strong, and we commend it to those seeking a simple and efficient hay fork. This invention was patented by L. Rundell, through the Scientific American Patent Agency, on April, 1862 ; further information can be had by addressing the inventor at Coxsackie, N. Y.

The Composition of Milk.

Milk has been so often analyzed that it would seem no further facts could be elicited in regard to this important liquid. Professor Boedecker, however, has just completed a series of experiments conducted on quite a new principle. The question he proposed to himself was whether milk obtained at any hour of the day always presented the same chemical composition or not ; and he has arrived at the result that the milk of the evening is richer by 3 per cent. than that of the morning ; the latter containing 10 per cent of solid matter, and the former 13 per cent. On the other hand, the water contained in milk diminishes by 3 per cent. in the course of the day ; in the morning it contains 89 per cent. of water, and only 86 per cent. in the evening. The fatty particles increase gradually as the day wears on. In the morning they amount to 2.17 per cent ; at noon to 2.63 per cent ; and in the evening to 4.32 per cent. This circumstance, if true, would be very important in a practical point of view. Let us suppose a kilogramme of milk to yield only the sixth part of its weight of butter, then the milk of the evening may yield double that quantity. The caseinous particles are also more abundant in the evening than in the morning ; from 2.24 they increase to 2.27 per cent ; but the quantity of albumen diminishes from 0.44 to 0.31. The serum is less abundant at midnight than at noon, being 4.19 per cent. in the former case, and 5.72 in the last.

Swelling of Cartridges by Rain.

On the evening of the 17th of June, 1815, the French infantry made a demonstration against the English lines, at Waterloo. This movement led the front ranks of the English to load their muskets ; and when the enemy retired, arms were piled in the usual manner ; but the charges were not withdrawn. From that moment the rain fell in torrents. When the troops unpiled arms in the morning, they found that they could neither withdraw the charges nor fire the muskets. The rain had soaked the cartridges, moistened the powder, and so swelled the charge, that the screw of the ramrod would not extract it. The English infantry were in as much despair as were the Belgian and Nassau squares a few hours afterwards, when attacked by the French cavalry. Their means of defense appeared to be gone. At length, a sergeant hit upon the expedient of swinging the musket around in a manner which dislodged the charge. The experiment was adopted with success along the whole line. Soon afterwards it appeared that the front ranks of the French infantry were in precisely the same difficulty. They had loaded over night for their intended attack. At the short distance which divided the front ranks of the two armies they witnessed our final experiment, and adopted it.—*Edinburgh Review.*

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